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OF THE

Michigan Schoolmasters' Club

FORTY-NINTH MEETING
Held in Ann Arbor, April 1, 2, 3, 1914

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Michigan Schoolmasters' Club

PROCEEDINGS OF THE FORTY-NINTH MEETING, HELD AT ANN ARBOR, APRIL 1, 2, 3, 1914.

EDITED BY THE SECRETARY.

GENERAL MEETING

The forty-ninth meeting of the Michigan Schoolmasters' Club began on Wednesday, April 1, with meetings of the Classical Conference and of the Principals' Association, and a Demonstration of Gymnastic Games and Dances by the young ladies of the University, in Barbour Gymnasium. In the evening, in Hill Auditorium, was held the Celebration of Bismarck's Anniversary. The principal addresses were made by the German Consul General, Alfred Geissler, of Chicago, and by President H. B. Hutchins, of the University of Michigan. A fine musical program helped to make the celebration a great success.

The General Sessions of the Club were held on Thursday and Friday mornings. Thursday morning was given over to the teachers of Commercial Subjects. Professor M. E. Cooley spoke upon "The University in Relation to Public Utilities," and Professor H. J. Davenport, of the University of Missouri, upon "The School of Commerce and University Ideals."

On Friday morning the general subject for consideration was "The High School." Mr. Charles McKenny, President of the Michigan State Normal College spoke upon the topic "What the High School Stands For"; Professor Calvin O. Davis, of the University of Michigan, upon "The Reconstructed High School"; and Superintendent Charles E. Chadsey, of Detroit, upon "The Training of Secondary Teachers."

On Friday evening the club listened to two fine addresses given in Alumni Memorial Hall. The first was given by Professor Andrew F. West, Dean of the Graduate School of Princeton University, and the second by Professor H. A. Sanders of the University of Michigan. The former spoke upon "The Results of the New Course of Study at Princeton," the latter upon "Our Gospels and the Early Manuscripts."

On Thursday afternoon the University Glee and Mandolin Club gave a concert in Hill Auditorium and in the evening the University School of

Music gave one in the same place. Both concerts were of high order and were greatly appreciated by large audiences.

Informal receptions for the members of the club were held at different places and helped to make the meeting a very enjoyable one.

A number of fine exhibits shown during the week were appreciated and highly spoken of by members of the club.

Special meetings of the Principals' Association, Federation of Teachers' Clubs, and of the Michigan Interscholastic Athletic Association, were held during the week.

The club has twelve Conferences. Eight of these held meetings on Thursday, and ten on Friday.

Never before were there so many registrations in advance of a meeting of the club, or so many requests for programs. This enthusiasm on the part of Superintendents, Principals and Teachers assured the officers of a good meeting long before the time set for the meeting.

The complete program of the meeting is printed near the end of the proceedings. Notice the fine list of members at the end of the Journal and also the schools that are alive to the educational interests of the State.

The Secretary cannot publish all of the one hundred and more papers, but will publish the papers of general interest and one or two from each of the twelve Conferences if turned in by the respective chairmen by the first week in May.

THE UNIVERSITY IN RELATION TO PUBLIC UTILITIES.

PROFESSOR MORTIMER E. COOLEY, UNIVERSITY OF MICHIGAN.

(An Extract.)

"We think the Mexican situation, and our foreign relations are serious questions for the public of this country to consider, but there is no problem today facing the American people that begins in importance with the relation of the public to the public utility corporations of this country."

"It is a lack of understanding that has brought about this very serious condition, and the duty of the universities and colleges is to train young men to go out into the world with a sane and unbiased vision regarding these great public questions."

"The public is accustomed to think of magnificent returns to public service corporations, but census statistics show that such is not the fact. In 1911 nearly thirty-seven billions of capital invested in public utilities gave a rate of return of only 2.3 per cent. With the omission of all stocks, the interest rate on the bonds alone would have been only 4.85 per cent. Compare these figures with the interest rates paid by savings banks and on farm mort-

gages. When the true conditions are understood will money continue to flow into public utilities? Except in favored cases the utility must eventually go begging for money. Publicly owned utilities may be the final solution. Compare this situation with the attacks being made today on public service corporations throughout the land, and ask yourselves what we, as a country, are trying to do. We are trying to undo the things which make our proud civilization possible. The civilization we know today could not exist except for the public utilities. It is an absolute necessity which the public is trying to throttle. The pathos of the thing lies in the fact that the public does not realize the importance of it all."

"Take Detroit, and some other cities of the land, they have been having great wars between their citizens and the street railways. I believe these wars in the main have been kept up for personal or political reasons, and not for the interests of the people, and yet any man who understands the question, could demonstrate to a group of high school students in five minutes, given chalk and blackboard, the real question and answer. It is largely a matter of arithmetic."

"The public service officer is today apprehensive of the conditions facing him, and is trying to straighten the tangle out. Once he forgot that the franchise granted him by the public was a right to do business, and not to make an unholy gain. Today he knows that he must make only a reasonable gain, and a reasonable rate of return is that which tempts the investment of money in the utility. We expect a five or six percent return on money invested where there is no danger, but in public utilities there is always the danger due to unsetttled public opinion."

"Not a mile of new railroads has been laid in Michigan in ten years, none in the United States to speak of, but each corporation is working out greater efficiency for the lines it owns and economizing in many ways. The very people whom the new railroads would serve, if built, make it impossible for them to be financed."

"The duty of the universities is to engage in a campaign of education; they need to teach young men what a public utility is, and what it means to the public. The United States was never in a better financial condition than today. There is plenty of money, but not one dollar is being ventured in new utility business. On every hand there is doubt, suspicion and unrest."

THE RECONSTRUCTED HIGH SCHOOL.

PROFESSOR CALVIN O. DAVIS, UNIVERSITY OF MICHIGAN.

(A Synopsis.)

The problems of the high school may roughly be grouped under five fundamental headings, those pertaining to: first, the individual to be educated; second, aims; third, means; fourth, agents; fifth, methods. Three

of these groups of problems are being considered today, the special group allotted to me being that of means.

It is a truism to state that the aims of any system must always determine the means. The aims of the high school may be briefly formulated as seeking to develop a socialized individuality. That is, the high school seeks to develop a being who is capable of exercising a forceful, many sided personality and who is also not only sensitive to the social needs of the age but possesses the desire and skill to cope with some of these needs effectively.

Two fundamental principles underlie the realization of this conception of high school aims: first, education must be made purposeful, that is, must be motivized; second, education must take on the form of participation in activities that are closely akin to life activities. The common criticism of the day is, however, that our schools do not adequately and satisfactorily produce trained, socialized individuality, and the remedy for the weakness seems to lie in a complete reconstruction of the school system, the elementary school as well as the secondary school.

Such a reconstruction involves first of all a change in the form of the organization. The present plan of eight years devoted to elementary school and four years to high school is purely accidental and is justified neither by the facts of logic, of psychology, or the practices of other contemporary peoples. Logically the schools ought to meet the needs of those for whom they are designed. That is, the schools ought to give an adequate training to all classes of individuals who seek development through education. A public school in a democratic state can be justified on no other grounds. It is a well recognized fact however, that our system as at present organized fails lamentably in holding in the schools thousands of individuals who ought to be enrolled. The work of the secondary school ought to begin its task coincident with the time that pupils enter the secondary biological period, that is, at the period of adolescence. Adolescence usually begins at about the age of twelve. As at present organized the high school first admits boys and girls two years beyond the true beginning of the adolescent period.

Likewise, contemporary practices in other lands, notably in England, Germany, France and Japan, are at variance with the American plan of organizing school work. In none of these countries does an undifferentiated elementary school extend through a longer period than six years. In none of these countries is the beginning of secondary education deferred until the youth has attained the age of fourteen or fifteen years.

The purpose of the elementary school is to give a command of the tools of culture; for example, fundamental facts, physical and mental habits, dexterities, sentiments, conventions and the like. The purpose of the secondary school is to furnish a testing place and a testing time for adolescents, that is, a time in which youths may discover their dominant life interests and aptitudes, and having discovered these, to develop them as fully as possible

within the time and with the resources at their disposal. As at present organized, however, neither the elementary nor the secondary school has any specific task or distinct function, but each encroaches upon the field of the other. The result is duplication, waste, weakness. While many of these defects are to be found in all portions of the school system, the weakest section in the entire course is that covered by the seventh, eighth and ninth grades. The work of these grades is hybrid-like, partaking of the character of the work of both the elementary and secondary schools and doing neither type of work well. In consequence there is elimination, retardation and dissatisfaction to a degree that is wholly unwarranted.

The explanation of the weakness at this particular point is, as has already been implied, because the schools are dealing with a different type of boys and girls than those of the grades below, and yet dealing with them in no undifferentiated manner. At this period occur most notable changes in physical, intellectual and mental life. Nature craves variety; individuality demands recognition. The rational faculties develop rapidly and seek modes of expression; new social interests arise; and a yearning desire for freedom and a restlessness under external repression are present. To meet these changed conditions calls for a modified education—an education that is much more clearly motivized than the earlier education, that takes into account the rational elements of teaching (and not solely the memoriter and drill process), and that provides a discipline that is in harmony with the new spirit of adolescence.

The plan of a reconstructed school system contemplates, therefore, a reduction of the present elementary school course to six years and the organization of the high school course so as to include all the work offered beyond the sixth grade. Whether the reconstructed secondary school shall be a unit of six years, or shall be organized into two divisions of three years each, or in two divisions of two years and four years respectively, will doubtless depend upon local conditions and the judgment of the administrators in charge. Seemingly the six-three-three plan is to prevail, the first group of three years constituting the junior high school, the second group constituting the senior high school. For communities which are able to carry the high school work beyond the present attainments, an eight year high school seems to offer promise. Such a school should include not only the four years now devoted to secondary training, but should also incorporate the seventh and eighth grades below and the first and second years of college above. This plan is meeting with much favor, particularly in the state of California, and has its advocates in many other sections of the country.

Accompanying this modification of form must go a modified program of studies. Within what is now the seventh and eighth grades will be found new academic subjects (Latin, German, algebra, geometry), manual training, domestic science, fine arts, commercial work, home craft, and subjects that are distinctively prevocational in character. Coincident with the in-

clusion of the newer subjects in the program of studies will go to the elimination of many topics now traditionally included in the seventh and eighth grades, especially much of the arithmetic, geography, history and grammar that occupy so conspicuous a place. In order to provide for the proper administration of a reorganized program of studies of this kind several distinct curricula will necessarily be needed. Four such curricula will doubtless find place in every large system. These are the academic, commercial, the industrial and the home craft curricula. Within each of these curricula a nucleus of prescribed subjects will doubtless be found, but, beyond the absolute prescription of studies, limited elections must be provided.

In like manner the reconstructed high school involves many additional changes above the seventh and eighth grades. First, such a school contemplates an addition of many new activities. Besides the instructional activities there will be found, in an increasing degree, the social, artistic, vocational and recreational activities. That is, within the reconstructed high school activities will be incorporated that now find place chiefly in the home, the shop, or the play ground, and in club rooms, art galleries and amusement halls. In short, the new ideal contemplates making the school the center of activity for the boy and girl in respect to all youthful interests.

To provide for the newer activities calls in turn for buildings of different types from the ordinary high school building of today. In addition to assembly rooms, libraries and reading rooms, museums, shops, recreation centers, and rooms devoted to dramatics, moving pictures and musicals must be provided. In many rooms no fixed sittings will be found and no routine of activities will be inexorably prescribed. Like the famous school of Vittorimo de Feltra, the reconstructed high school will constitute a "pleasant house" that will attract, by reason of its many-sided appeals, youths of all ages and of all temperaments.

A reconstructed school built on the plan thus outlined demands, further, a modified school day. Instead of a day beginning at 8:30 in the morning and closing at half past three in the afternoon, there will be found a school day extending from 8 o'clock in the morning until 10 o'clock at night, open not only during five days of the week, but for six or seven. It is not expected, of course, that any teacher, administrator, or pupil will necessarily be in attendance throughout this entire period, but the building will be open, and facilities will be provided, so that those who wish to avail themselves of the opportunities may find a place in which to gather. The modified school day will also call for a modification of the present type of recitation period. Instead of the teacher merely meeting the classes to hear lessons, the teacher will meet pupils to aid them to study lessons. Thus supervised study will become a regular factor in the day's work. Whether such supervision shall involve a continuous period of ninety minutes, one half devoted to the preparation of the lesson, the other half to the recitation of the lesson, or whether the two types of activity shall be separated entirely, is a matter for local conditions to determine. Certain it is that instead of turn-

ing young people out in the street at half past one or two o'clock in the afternoon and permitting them to waste the afternoon, as is too often the case at present (thereby forcing upon them the preparation of lessons in the evening at home and oftentimes under adverse conditions), study in the future will be carried on chiefly within the school building itself.

The longer school day implies, too, that the more difficult academic subjects shall be assigned to the earlier hours of the session, that the early afternoon shall be devoted to laboratory work, shop work and other forms of application, and that the later afternoon shall be utilized for recreation purposes. The ideal calls for the organization of the entire school into one great recreation body at the close of the working day, and the making use of the gymnasiums, playgrounds and athletic fields,—all under the direction of skilled leaders. The ancient Greeks, with their wonderfully perfect bodies, their brilliance of mind, and their social and civic activities, furnish a type for imitation, and their civic gymnasiums and recreation parks suggest the plan of organization and administration.

Within the reconstructed high school the social center ideal will find perfect recognition. From 7 o'clock to 10 o'clock in the evening so much of each building will be open as the demands of the community make desirable. None, of course, will be compelled to be in school during these hours, but with gymnastic exercises, dramatics, musicals, evening classes, shop work, receptions, dances and similar diversions the school ought to serve as the most inviting spot in the community. It ought to make its appeal so strong that the saloon and the gambling joint, the back alley and the street corner should no longer be rendezvous for any young man or woman, or for any recreation-seeking adult.

Throughout the upper grades of the high school thus planned the program of studies will, therefore, be as extensive as the social needs of the community, provided only that the community can economically offer such a program. But to administer a program of this type will call for the modification of the present uniform five period per week class assignment. Instead of devoting a few weeks to a given subject and then allowing it to pass altogether from thought, a longer continuity of attack will be demanded, thereby endeavoring to give each individual a greater mastery over a limited field of knowledge rather than encourage the dispersion of effort over many fields.

Within the reconstructed high school correlation of activities will receive large attention. Correlation between school and shop will be found in every city; correlation between farm and school will be found in every rural district; correlation between home and school will be found in every community. Opportunity for the special student to come to school when he can, take what he feels the greatest need of, and leave when he must, will be granted. Opportunities for adult classes, weekly or daily as the case may be, will be offered. Opportunities for continuation work open to those already employed in business will be common.

The reconstructed school system, therefore, suggests that an undifferentiated elementary school shall be found in every small community and in each conveniently apportioned section of the larger communities. Supplementing the elementary school and standing at the center of each large educational division of the city will stand the junior high school, offering several parallel curricula and providing no small amount of free election of studies. And, finally, at the center of each city, or of the very large divisions of each city, will stand the senior high school, providing not only the work commonly provided today but extending the scope of study far beyond the present limits and making it available to scores and hundreds to whom it today does not appeal.

There is only one serious obstacle to the realization of the ideal here presented. In order to administer a system of education as extensive and diverse as the above plan demands will call for financial support that is both unusual in amount and uncommon in derivation. Not only must the local communities provide liberal budgets, but, in addition, bonuses from the state and national governments must be made on a generous scale. In this way, and in this way only, can a fully adequate reconstructed high school system be realized and be made effective.

The reconstructed school system contemplates, therefore, the incorporation of the best elements that each successful undertaking of the past has proved feasible. It includes the supervision of study and the continuity of intellectual training that are characteristic of the best secondary schools of Europe today. It includes the close attention to manners and morals that is provided in the best boarding schools or private schools of the land. It includes the practical applications of theory in ways similar to those employed in the best apprenticeship schools of the past. It includes active participation of the entire school—pupils and teachers alike—in wholesome and directed recreational activities near the close of the day, in much the manner the Greek nations enjoyed recreation. And it includes continuation study, evening classes, and the various activities of social life that are to be found today in the most thoroughly organized school systems everywhere.

If the objection is made that a system of schools of this scope relieves the home and parents of most of the responsibility of educating and controlling the youth, the only reply is that such delegation of responsibilities has already been made and that, (to quote a much used dictum) "It is a condition and not a theory that confronts us." An increase in school activities, an enrichment of the program of studies, and a lengthening of the school day in no wise necessarily puts increased burdens on pupils or teachers or administrators. Because the banquet is set is no valid reason for anyone to over-indulge the appetite. Each person, however, can find provided him such nourishment, stimulus, and relaxation as is suited to his needs, and each administrator can devote so much time and energy to the work as is consistent with health, happiness and efficiency.

CLASSICAL CONFERENCE

THE ADVANTAGE OF A CLASSIFICATION OF WORDS BY CONCEPTS IN LEARNING LANGUAGES.

WALTER N. HALSEY, DEAN OF THE UNIVERSITY OF OMAHA.

Some years ago the Hon. Chas. Francis Adams, Jr., delivered a memorable address at Harvard University. He undertook to show that Latin and Greek as learned in our schools and colleges was practically worthless, for the reason that scarcely any of our students, even after five or six years under the best instruction, can read the ancient classics with ease and enjoyment, and that too often this is true of those who teach these languages. No wonder Latin and Greek are called dead, although the content of them in the days of the Renaissance did so much to revivify, yes, to give new existence to the intellectual world.

Realizing that this charge has in it a measure of truth, educationalists have sought the cause. The ingenuity of teachers has been shown in all sorts of methods and devices, text-books of wide variety have been issued, but still these languages fail to get a germinating lodgement in the minds of the majority of their devotees.

We are still asking ourselves, "Why?" We admit that there have been times when Latin literature was read with intelligent appreciation and with inspiring and stimulating results, but those were days when Latin was not learned by the analytic method from the very start. It was to be learned for use. The empirical method employed today for the learning of modern languages was employed. Must not every American, whether unrefined or cultured, first learn to speak and understand, that is to *use* English, before he can analyze English with profit? Exercises, parsing, declension and conjugation, grammatical rules and vocabularies never yet have put a human being into useful possession of a language; witness the testimony of Dr. R. S. Rosenthal whose language books have by thousands facilitated the mastering of European languages.

"In 1872 I was appointed General Interpreter for the city of New York. I very soon found that although I understood the grammars of about twenty languages, and could read and translate them, I, nevertheless, was incapable of carrying on an hour's conversation in any of them." It became necessary for him to secure colloquial mastery over these tongues, before he could become a real linguist. This mastery is ordinarily the first step in the experience of those who really become proficient in a language. It is not so difficult a step as it may seem to those who have not tried it, although there may be no great linguistic attainments without patient attention and continued effort.

As a teacher of languages I have felt the need of a better method of bringing a language home to the very life of pupils. The common methods have been tried with disappointment. When the attention is continually fixed on grammatical forms and relations, the mind does not form the concepts which are the germ of the words; there is no comparison of concepts, no differentiation of them, no relating them, such as would lead to the real apperception of the notional elements of the word.

As a result of the study of forms and of fixing the attention on them alone, much of the translation, even of advanced students, is but a refined, although a somewhat freer form of "metaphrasing;" true translation should, however, be preceded by an actual grasp of the thought directly from the ancient language with no interposition of a second tongue. After that the thought should be expressed as elegantly and as forcefully as possible in the second tongue.

Above all other things, the study of language should lead to the clear and direct thinking of the thought contained in that language, and all training ought to lead to this end. The purpose of the study of a language has been largely attained when ability has been acquired of freely seizing upon the content of the symbols.

Words may be looked upon as three-fold: spoken, written, and concept words. What is ordinarily called a word is really only the written, printed, or oral husk or mask of the *word;* through these visible or vocal signs the organizing, vital element of language is known to us; this invisible, spiritual element is to be wrested from its husk and its substance is to be assimilated into human spirit, before the word is known. The full comprehension of this all-important truth accounts for our disappointment in the results of our teaching. All study of forms which terminates before full familiarity with the spirit is in a sense a sham and a disappointment.

What study will best serve to fix the mental vision on the content of words? Real translation should do this; so should the study of etymologies, synonyms, prose composition and double translation. I have found still another kind of word study helpful.

The first step was the selection of a working vocabulary. This was chosen upon three principles:—(1) Words which will occur with great frequency in the course of reading Latin literature. Such lists have been provided by Tolman, Lodge, and others. (2) Root-words which occur less frequently, and yet are the foundation of and give the clue to the meaning of numerous Latin and English words. The material for these lists has been furnished in the groups of root-related words found in the Caesar of Greenough, D'Ooge and Daniell. (3) These lists must contain only words that can be related in some way to the experience of the learner and each word must be capable of expressing, or at least symbolizing, his own mind and experience. The words furthermore must be in sufficient number to cover the range of ordinary experience.

To learn such a list may seem a formidable task. Can such a list be mastered before the task shall seem hopeless? Language can be divided into four kinds of terms:—(1) necessary, (2) convenient, (3) technical, and (4) literary. This is the order in which we learn our own language, beginning with necessary terms, such as verbs and nouns, and these are the words we use most frequently in every-day experience. Verbs and nouns form the warp and woof of language. Pendergast estimates that the generality of mankind uses but 600 words. The experience of the writer shows that, if 700 Latin words be known by the student from the standpoint of real mental experience, an immense amount of vocabulary-hunting, hesitancy in translation, cribbing, and inefficient study can be avoided. These can be thoroughly learned in fourteen weeks at the rate of fifty a week, or ten a day, together with other language study.

One reason for our failure in teaching Latin is that often we do not teach Latin, we only teach *about* it. I do not advocate the learning of the spoken language. The problem is to secure a real translation of the terms in these lists into the terms of the students' experience. Is it possible to learn to think in an ancient language? That has been the purpose of methods advocating the use of object teaching, the use of maps and other illustrations. This is the principle employed by Guoin (of the École Superieure Paris), in requiring a pupil to perform a series of acts and then to describe the series in the new tongue. The pupil is thus translating the vast book of his personality into that tongue. There must be a mental reconstruction of the whole external and internal life into the Latin terminology. The vocabulary planned for my classes aims to do this in the teaching of the lists and groups. The verb lists cover a wide range of activities, enough to illustrate every general verb notion. The nouns are arranged in lists beginning with space, followed by matter, plants, animals, man, society, institutions, intellectual, volitional, and emotional attributes. Adjectives and the other parts of speech are arranged on similar principles. The pupil has already more or less classified his experiences into these groups. They are familiar. He recognizes the relationships involved. The general ideas in the classes and the specific distinctions are a part of his experience, so when he finds these words thus related, he easily makes them terms for the thoughts for which they stand, as he would not be likely to do, if he learned them separately. The vocabulary thus becomes a related whole in itself, and is related to the pupil as an expression of his classified knowledge. He recognizes that in these groups new terms can be inserted expressing shades and phases of the general idea of the class. He has a consciousness of proceding in an orderly way and the plan appeals to him as reasonable. The words cease to be dumb signs of a dead past, but are associated with a living present, the present surrounding his own personality.

A distinct advantage of the use of classified lists, such as the one presented at the end of this paper, is the ease with which long lists are memorized after one careful analysis of the meaning (not English equivalent) of

each word, and the general idea in the list. The teacher will of course see to it that the first attempt of the pupil to learn any list is attended with a full comprehension of the uses of each word, its root-relations, its resemblances or contrasts, and its space, time, or logical relations with the other words in juxta-position to it. Much of this will be seen by the pupil after he has learned to look for it and understands the interest and value of such a grasp of the content. The strength of the association depends upon the vividness with which the term is associated to its meaning the first time it comes into the mind.

In using the word-lists, charts are placed before the class giving groups of words without any indication of the meaning either of the words or of the extent of the groups. The first chart contains verbs. Attention is called to the fact that we may broadly divide verbs according as they express psychic or corporeal acts. This is illustrated from the text of the lesson for translation. Then it is seen that of the mental acts some are purely psychic, such as are expressed by *arbitror, cognosco,* and others include sense (motor) activity, such as, *specto, audio, sentio*; on the other hand, corporeal acts are most common as verbs of locomotion, as, *eo, venio, cedo, commeo, gradior,* etc., as suggested in the accompanying classification. So pupils are led on to see how the new words which they meet belong in familiar classes and are thus enabled to extend their word-lists. After a time pupils turn to the charts which they have not memorized to find the meaning by a process of association with the other words in the list. Pupils also voluntarily copy the lists and commit them to memory with ease. The lists are well worth committing whether one is to complete a Latin course or is to change, after a year or two, to other courses.

The lists and charts, once mastered, will again be valuable for rapid review, thus causing a rapid recognition of the general and of the specific notions involved. The words can be reviewed for forms as the genitive of each of the nouns, or in other cases, from the point of view of the modification of stems, forms and gender, etc. Words from the lists can be fitted together for prose composition.

A Few of the Most Common Latin Verbs Classified by Their Sense.

Psychic Acts:

Senses: Specto, Video, Audio, Gusto, Olfacio, Sentio, Tango.

Intellect: Animadverto, Certior fio, Scio, (Cog) nosco, Existimo, Puto, Arbitror, Intelligo, Judico, Constituto, Cerno, Experior, Disco, Cogito, Reor, Credo, Dubito.

Emotion: Spero, Timeo, Vereor, Opto, Studeo, Diligo, Amo, Odi.

Will: Volo, Audeo, Conor, Coepit, Administro, Gero.

Motor: Scribo, Rideo, Laboro.

Voice: Loquor, Appello, Nomino, Voco, Dico, Quaero, Respondeo, Oro, Peto, Posco, Postulo, Jubeo, Clamo, Nego, Polliceor, Iuro.

Affecting other minds: Paco, Sollicito, Incito, Juvo, Fallo, Certo, Terreo, Vexo, Placeo, Confido.

Possession: Potior, Occupo, Habeo, Teneo, Capio, Sumo, Emo, Vendo, Do, Libero, Debeo, Possum, Oportet, Suesco.

CORPOREAL ACTS:

Locomotion: Eo, Commeo, Curro, Orior, Cado, Volare, Navigo, Ascendo, Venio, Gradior, Proficiscor, Sequor, Reverto, Adpropinquo, Grego, Contendo, Cedo, Migro, Fugio, Relinquo.

Transitive Locomotion: Fero, Porto, Mitto, Moveo, Duco, Traho, Ago, Pello, Rapio.

Affective (No change in object): Paro, Jungo, Pleo, Flecto, Claudo, Aperio, Servo, Impedio, Pendo, Sterno, Supero, Acuo, Plico, Utor.

Productive (Change of Nature): Creo, Facio, Aedifico, Muto, Fingo, Finio, Fodio, Seco, Caedo, Scindo, Uro, Populor.

Intransitive: Sto, Sedeo, Jaceo, Sileo, Vivo, Spiro, Morior, Voveo, Candeo, Pateo, Lateo, Nascor, Cresco, Caveo, Erro, Impetro, Sum.

WHY STUDENTS WHO PRESENT LATIN FOR ADMISSION DO NOT ELECT LATIN IN THE UNIVERSITY.

PROFESSOR A. R. CRITTENDEN, UNIVERSITY OF MICHIGAN.

In introducing the subject for this conference this afternoon, I conceive my function to be to state the essential facts, and to raise certain questions. I should like to make it clear also that the conditions of which I speak are not the result of any startling change, and have not come about suddenly. On the contrary, the figures which I shall give for the present academic year represent approximately the situation that has prevailed here for the past five years at least.

In a memorable address before the Phi Beta Kappa Society in Ann Arbor in 1911, Mr. James Bryce, then British Ambassador, made use of the following words:

"It is much to be regretted that the number of men who are studying Latin is becoming small, and the number of those studying Greek, infinitesimal. I venture to predict, however, that if the universities can safely pass the danger period that is threatening us now, in twenty or thirty years there will be a great reaction in the attitude toward these ancient literatures. The pressure of intense competition in business will diminish in the next generation; the great corporations will have largely completed their exploitation of natural resources; gainful occupations will relatively decrease in importance; the ideals of men will return to those subjects in which the ancient

literatures contribute to make life rich and enjoyable, and the study of the classics will revive."

How are the universities succeeding in bridging the critical period? For the past twenty years the air has been full of educational discussion. For some reason the classics have been the storm center. Much of this discussion has been the expression of mere opinion, and some has been based on knowledge. In the past the classics have not suffered from the lack of ardent defenders. But the most authoritative testimony as their educational value has always come from *those who know*—that is, from those who have had broad and thorough training in the classic languages and literatures. In the next generation, as in this, the most effective witnesses as to the function and worth of Latin in American education will be, not those who have had two or three years of Latin in high school on the one hand, nor teachers of Latin on the other hand, but men and women eminent in other walks of life, who have included in their preparation for life and its work a thorough acquaintance with the language, literature, and life of ancient Rome. It is worth our while to inquire how the number of these is being recruited.

The University of Michigan is one of the great American universities. Conditions here are perhaps a fair index of conditions throughout the country. Of a freshman class of about 800 entering the Literary Department in the fall of 1913, 293 presented two years of Latin for admission, 108 presented three years, and 190 four years. In round numbers, three-fourths of the class had studied Latin in high school; about half of these had taken Latin two years, and about half either three or four years. Evidently the high school classes in Latin are influencing, in some degree, a good proportion of the students who come to college. But of the 190 students entering with four years of Latin, only 42, or 22 per cent, continued their Latin in the University. And of the 298 students who entered with either three or four years of Latin, only 52, or 17 per cent, were found in our freshman classes. Speaking in round numbers again, four-fifths of the students who were eligible to enter the freshman Latin classes failed to do so.

If such conditions prevail, and continue, throughout the country, the number of men and women qualified to speak with knowledge and authority of the educational value of Latin is bound to be very small in the next generation, and the universities may fail to cross the critical period as successfully as we could wish. If college students in considerable numbers do not continue the study of Latin and of Greek, then the finest part of our magnificent heritage from the civilizations of Greece and Rome is bound to remain unknown and unappreciated. The situation is sure to be a large factor in the history of classical study and teaching in America. It is of vital concern, not only to those directly interested in the classics, but to all who hold that no scholarly or adequate interpretation of the facts of our present civilization is possible without a first-hand acquaintance with and a

sympathetic appreciation of the highest intellectual achievements of the race in the past.

How shall we account for the surprising falling off of Latin students between high school and college? At a time when the departments of law, medicine, dentistry, and engineering are outspoken in their endorsement of Latin as one of the most valuable educational instruments for men entering those professions,—when women's clubs and other groups of busy people seeking to give their scanty leisure to the study of those subjects affording the highest and most enduring mental uplift, are continually turning to the art, literature, life, and history of the Greeks and Romans,—are the philosophic works of Cicero and Lucretius, the history of Livy and Tacitus, the poetry of Horace, the study of the law, politics, and administration of the Romans, no longer worthy the time and attention of young men and women who aspire to a liberal education?

Naturally the facts observed have suggested a searching inquiry into the content and the pedagogic method of the freshman work in Latin in the University. That inquiry has been in progress for several years, and much careful study and experiment has been employed to make the work effective. It is due to our students and teachers to say, that most of the students in our freshman classes are well prepared, and that almost without exception they are willing and eager to work hard; there is no lack of interest and enthusiasm in the classes, and as a rule a good proportion of our freshman students elect the more advanced work in succeeding years. The burden of the problem would not seem to be in the conduct of our freshman classes, but in the disproportionately large number of Latin students who never come within reach of the Latin Department in the University.

High school teachers sometimes complain that the study of Latin in their schools is discouraged by the indifference or the hostility of supervising officers. Neither teachers nor students encounter this difficulty at the University. The attitude of the administrative officers here has been uniformly just and impartial. As a rule, students entering the University are asked by the Committee on Elections whether they wish to continue the subjects in which they have done most work in high school. The great majority of Latin students answer promptly in the negative. Apparently, many of them have settled the question in their own minds before coming to the University, or at least before meeting the Committee on Freshman Elections.

What are the reasons, and what the remedies, for this surprising state of affairs? I can suggest only a few of the more apparent causes which appear on the surface here at the University. Among these may be mentioned the fact that many students, in making the change from high school to college, naturally wish to change the subjects studied as well. Our freshman students often present themselves at the University planning to take up the study of political economy, sociology, forestry, business administration, journalism, or what not, at the very outset of the college course. Another reason is found in the fact that freshman Latin is a purely elective subject

for all students, while a number of other subjects are either required or strongly advised for students preparing for certain vocations. Even the student who is not shaping his academic course with reference to his future vocation finds certain subjects emphasized by university legislation or by public sentiment, while College Latin is almost wholly unstressed from any quarter. As a result, the courses of many students are crowded, even in the first two years, and, as they express it, they have no time to continue Latin.

I fear we must admit too that a very considerable number of students are deterred from the study of Latin in college by the amount of hard work required for its mastery, and elect in its stead equally attractive and interesting subjects which can be carried with less strenuous mental exertion. The lack of concentration and thoroughness which is so conspicuous a fault of our modern education, and the consequent disinclination to serious intellectual application on the part of many students of good native ability, militate strongly against the election of those subjects for whose mastery such vigorous mental exercise is indispensable. Whether or not this is a distant echo of the use or abuse of kindergarten methods earlier in the student's career, as some have supposed, it is undoubtedly a large factor in influencing college elections, as is frankly avowed by many students.

Another rather widespread and potent factor is student gossip. There are fashions in students' elections as much as in their dress; they are much too prone to flock like sheep, losing sight of the highly important fact that what is the best course for one person may not be the best course for another. On being questioned as to what subjects he is studying, our freshman sometimes replies that he is taking "the regular course," evidently having been informed by some student what was "the thing to do."

But neither any one of these causes, nor all combined, are sufficient to account for the wide discrepancy between the number of Latin students entering the University and the number continuing the subject in college. The problem has received much thought and care here at the University. Now we bring it to the high school teachers as well, with the hope that it may be discussed frankly and thoroughly, without pessimism, and in a helpful and constructive spirit. Of course, in these days, not every college student should study Latin, any more than every high school student should go to college. We may as well face squarely the undeniable fact that in view of the rapid broadening of the college curriculum, the individual student can not go far in all, even of the staple subjects of college instruction, though we may still hold, with Comenius, that at some point in his education, each student should be *introduced* to each of the great fields of human knowledge. But if it is true that each student can not take all subjects, it is equally true that all students should not take the same subjects. There are diversities of gifts. The broadening of the curriculum has brought selection. Now it should also bring discrimination. For a very considerable number of aspiring young men and women who come to college, the study of Latin presents

an exceedingly rich content, and the mastery of that content affords the very finest kind of intellectual training, both cultural and practical. May it not be a proper function of the high school teacher of Latin to note the presence in his classes of students of this fine type, to minister carefully to their mental and spiritual development, and to send them to the University with the disposition, and the determination, to drink deeply at the fountain of classical culture? The student who is to go forward with such an ideal must needs be strongly fortified, for he will have to run the gauntlet of an indifferent or a hostile public sentiment, both in college and out. But the attainment of his ideal is of importance to all friends of the classics alike. It should be born in mind too that the Latin Department in the University is powerless to help the large number of Latin students who keep outside the range of its influence. The responsibility rests chiefly with the high school teachers.

It may be of interest to know that for the last two or three years we have noted a decided increase in the proportion of men in our freshman Latin classes. The movement is worthy of all encouragement. If the Latin work in high school can be made more virile, more vigorous, and if a larger number of promising young men can be attracted into the high school Latin classes, and encouraged to continue Latin, or better, both Latin and Greek, in the University, the cause of classical education in the country will be largely the gainer, and the highest interests of the students themselves most effectively subserved.

FRESHMEN ELECTIONS OF LATIN.

PROFESSOR ARTHUR G. HALL, UNIVERSITY OF MICHIGAN.

The policies of the University are naturally conditioned by the tendencies of the times and the trend of public sentiment, while they are definitely determined by the deliberations and legislation of the faculties. The administrative officers are in duty bound to administer these regulations fairly and impartially. While, as professor of Mathematics, I am friendly disposed towards the other studies of long standing and proved worth; as an administrative officer, I must of course treat all subjects with equal justice.

During recent years two notable changes by enactment have affected greatly the branches taken by students both before and after they come to the University. Prior to 1900 the University maintained four different courses, based on distinct entrance requirements and, with rather closely prescribed curricula, leading to distinct Bachelor's degrees in Arts, Philosophy, Science, and Letters. In 1900 a single degree was granted to all graduates and a single set of entrance requirements was laid down. Two years of a foreign language were demanded of everyone, which might, however.

at the option of the applicant, be either Latin, or French or German. In the four years course leading to the new or general A.B. degree no studies were prescribed, save six hours of Rhetoric.

As might be expected, there was a decided falling off in the number electing Greek, Latin, and Mathematics. The following table shows the number of students taking the freshman courses in these three subjects just before and after this change and at the present time. The columns headed Total, Greek, Latin, Math., contain the total number of undergraduates enrolled in the Department of Literature, Science, and the Arts and the numbers taking freshman Greek, Latin, and Mathematics, respectively, during the first semesters of the years named:

YEAR	TOTAL	GREEK	LATIN	MATH.
1899-1900	1256	95	190	360
1900-1901	1261	64	178	412
1913-1914	2614	24	85	570

Again in 1912 new requirements for admission and for graduation were adopted. The new, or so-called vocational branches are now accepted for entrance to an amount not exceeding three of the fifteen required units. Greek and Spanish were placed on a par with the three languages before named. Mathematics was still harder hit, inasmuch as the amount made obligatory was reduced from three units to two. While it is formally possible for students coming from large high schools on the list of the North Central Association of Colleges and Secondary Schools to enter without presenting one or other of these subjects, the instances which actually arise are exceedingly rare. The new group requirements for graduation will tend to distribute the student's work to some extent over the three fields of Ancient and Modern Langages and English, Mathematics and Science, and History, Economics, Philosophy, and Education.

The question which we are considering this afternoon is, Why students do not continue the study of Latin in the University? To sum up the answer into a single sentence one may say, It is because they think that some other branches fit better into the scheme of studies preparatory to their chosen careers. The claim that students avoid the older and harder studies does not seem substantiated by either of two groups of statistics. While the relative difficulty of various subjects is not adequately measured by the failures in them, such data do throw much light on this point. During the two semesters of 1912-1913 about 16½ per cent of those carrying freshman courses received the unsatisfactory grades D and E. In French, Physics, Mathematics, and Chemistry, over 20 per cent were thus reported in the order named; in History, Greek, and Rhetoric, the percentages were 17½, 16, and 14; while in each of the subjects Latin, German, and Biology, 8½ per cent were deficient. It is thus evident that students do not, in the main, flock into the easy courses or into the sections taught by high marking instructors.

The interests and demands of the industrial and community life of the present day call most emphatically to the attention of high school and college students studies of a modern or a practical nature. The school boys and girls of today are high minded as of yore; but they are educationally free thinkers. They are much less bound by authority or tradition, and their parents carefully avoid planning for them or exerting over them any controlling or restricting influence. The schools and colleges have realized this for sometime, and its effect on society is becoming very clear.

DISCUSSION OF PROFESSOR HALSEY'S PAPER.

DR. MASON D. GRAY, EAST HIGH SCHOOL, ROCHESTER, NEW YORK.

Definite efforts should certainly be made to give each word not merely an arbitrary equivalent but a correct connotation, that the translation may not be mechanical. The method suggested brings into play the leverage of contrast and comparison. But, while this is excellent for review, it does not seem to be available for the initial presentation of a word, for it would hardly be proposed to introduce groups of this sort in advance vocabularies. Furthermore it could be applied only in a limited number of cases.

Connotation depends upon environment. It seems logical, therefore, that each word should make its first impression upon the pupil through its environment. I believe, instead of having vocabularies memorized *before* a lesson is translated, that the new words should be first met in a context sufficiently full to enable the pupil to work out the meaning from the environment (assisted by English derivatives and Latin allied words) and thus at the same time to give the correct connotation. Vocabularies printed after the lessons, or better, at the rear of the book, could enable the pupil to check the result in each case and would afford assistance whenever the problem is too difficult for independent solution. Thus the pupil is trained in independent initiative. In our work the pupils receive careful training in this the first weeks. They are given a series of fifty English sentences each containing a Latin expression which they are expected to solve with the aid of the context, which is constructed with that end in view.

We have not been able to carry out this principle systematically as yet, because no book embodying such an idea has yet appeared. Pupils are instructed, however, not to study vocabularies first, but to seek to solve the new words by context, English derivatives and allied Latin words. It is from the close study of the context, necessitated by the whole method, that the first impression will convey the correct connatation of the word.

THE SOCIALIZATION OF THE CLASSICS: DISCUSSION.

MISS MARY F. FARNSWORTH, EASTERN HIGH SCHOOL, DETROIT.

In considering the definition of the "Socialization of the Classics" as formulated by Mr. Gray: "The development of their relation to life, of their capacity for social service, for interpreting to the pupil his environment, for becoming a means to a greater end and not an end in themselves," I am aware that, especially in the case of first-year Latin, this ideal is very distant. In one Caesar class, the teacher, hoping to elicit a general statement of the military operation which formed the subject of the lesson, asked, "What is Caesar doing in this place?" The student answered, "Serving as subject of the sentence." To him, as to many others, the text was merely a grammatical exercise in which forms and relations entirely obscured the subject matter.

In the same way, to the beginners, the vocabularies are mere meaningless tables to be memorized—quite unconnected with any personal experience of theirs. *Puella* stands arbitrarily for "girl" in precisely the way that X stands for the number of days A requires to perform a certain piece of work, and the idea that the word was once a commonplace on the lips of thousands of children like themselves is quite unconsidered.

To make these Latin words more vivid and significant I have tried the method of illustrating the vocabularies. My first idea was to find pictures of Roman scenes and objects to instil some appreciation of Roman life and customs together with the names of the things represented, but such pictures were difficult to obtain and often failed of their purpose because of the student's lack of historical knowledge with which to correlate them. A picture of the mosaic portrait of Virgil they hailed as *Agricola* and even after a full explanation, which occupied valuable time, they found it difficult to remember, while Shakespeare was greeted *poeta* at once and with acclamation. Then, too the children enjoy looking out for pictures for the vocabularies ahead and, though their offerings are often very amusing, they never forget a word for which they have found an illustration.

Each picture is pasted on a separate card, and they are frequently distributed and the students asked to attach to each word as many Latin adjectives as may be used with it appropriately, or to form as many sentences as possible by using it with different verbs. They form, also, an excellent basis for exercises in declension and the children, of course, enjoy contests in naming correctly the greatest number of them. After some explanation of the various avenues by which the Latin language has entered into ours, the pupils are much interested in finding English words connected with the Latin—it is much more concrete and human to discover that President Wilson, whose portrait (as our foremost citizen) we took to represent

Civis, is a civilian and civilized and civil, than coldly and abstractly to discuss derivations.

In short, I have found that the children learn their vocabularies more thoroughly and with infinitely less effort, encounter the inevitable drudgery with a greater stimulus of interest, and gain some appreciation of the fact that Latin was a living tongue, and the mother tongue which has nourished in times past and still contributes to our speech; and if this last can be carried on to increase constantly their insight into and dexterity in the use of their native tongue, surely an end will be attained which is one of the most practical in modern life.

DISCUSSION OF MR. GRAY'S PAPER.

MISS FLORENCE BATES BARNARD, SAGINAW HIGH SCHOOL.

Mr. Gray's account of what the Rochester pupils have been doing is full of suggestions for every teacher of Latin—all of which might, with profit, be discussed here—I, however, wish to emphasize just one, namely, the daily drill in derivation as a training in the habit of co-ordinating every *new* fact with other contemporaneous experiences: thus helping the pupil to socialize his Latin, either consciously or unconsciously.

Every boy—or nearly every boy—is interested in automobiles, wireless telegraphy, flying machines, etc. The terms and phraseology used in speaking of these things, and in newspaper or magazine articles upon them, are so closely connected with words which Latin pupils are constantly learning that the coordination is a very easy task for the teacher and a very pleasing one for the pupil. A recent article in the *English Journal* has a long list of such words and there is a helpful article in a late number of the *Classical Journal.*

May I here refer to a contest which we had a year or so ago, in our Saginaw high school? Different, *easy* root-forms, such as *duc* or *fac,* were put upon the boards in the Latin room, with the announcement that a friend of the Latin department had offered a prize for the best tree that could be grown from one of these roots. Wide latitude was given in the choice of derivatives; and great was our surprise, when the date for closing the contest came, to find that more than 50% of the pupils had been busy "gardening;" and we had so many fine specimens of trees that it became a difficult matter for the judges to decide which was the best; so three prizes were awarded in place of one. We also had contests in which prizes were offered for the best poetical translation of "Queen Mary's Prayer," and for the best translation into Latin, of Lincoln's "Gettysburg Address." This last proved too difficult for the majority; but a few of the Seniors persevered in it, and presented some quite praise-worthy translations.

Saginaw High School also supports two flourishing Latin Clubs, one for the Seniors, Juniors, and Sophomores, in which membership is purely voluntary; and one composed of all those who elect Latin IX (or Beginning Latin). Both of these clubs are managed by the pupils, who even plan for and carry out the programs, with very few suggestions from the faculty advisor. Much of the secondary work, which is so helpful for general culture, but for which so little time is offered in the class room, is thus accomplished, and the pupils are aroused to an interest in outside reading which, we hope, will continue after their school days are ended.

OUTLINE OF REPORT ON LATIN IN THE GRADES IN JUNIOR HIGH SCHOOL IN GRAND RAPIDS, MICHIGAN.

ANNA S. JONES.

Classes: In 1912-1913 a class in 8th grade completed 9-1 and ½ of 9-2 Latin. In High School now are twenty pupils who have gained one semester or more in their Latin course. Two classes were started in 7-2; these classes discontinued work in formal English grammar except as taught in connection with Latin. These classes are ready for 9-2 Latin on entering High School.

Conditions found in dealing with children of 7th grade: Habits of inattention and inaccuracy, a desire to impart rather than to receive information, an inability, or unwillingness to memorize, and a carelessness in following directions; on the other hand, a readiness to prepare written work and an ability in handling materials; an unlimited enthusiasm for something new; a superficial attitude of mind due to a complicated and crowded program which is partly the fault of the school, but largely the fault of the home.

Methods. If English grammar is to be taught in connection with Latin, begin it in the 7-1 grade, and have the work in composition provided for in another class. The "Direct Method" always arouses interest, but must not be used to the injury of the English side of the class exercise. Have pupils commit to memory many Latin quotations which illustrate points in both Latin and English. Use wall charts, maps, pictures of Roman houses, streets and costumes as a basis for conversation and vocabulary drill. Read something outside of the text-book. Have each class give a simple play, like those in "Decem Fabulæ." Have pupils prepared to enter a definite class in High School, not repeating work already covered in the grades.

Advantages in introducing Latin into the grades. First, specific advantages to the Latin student: by taking the work slowly and at an early age he learns vocabulary, pronunciation and forms more thoroughly,

and he develops a feeling for Latin word order. Secondly, the more general advantages; habits of study can be gained by contact with Latin which is more definite and less difficult than English; a study of Latin in the grades enables the pupil to make a wiser choice of subjects when entering High School; he is thrown with older pupils and his ambition is aroused; he gains time for more advanced work; Latin is a help in understanding English grammar and this help cannot come too soon; Latin in the grades is an important move toward bridging the gap between 8th and 9th grades.

Things to be desired: More serenity in the atmosphere and more simplicity in the day's program; a primer of Latin and English for use in 7-1; a uniform system of nomenclature; Latin teachers who are familiar with 7th and 8th grade English, who understand young children, and do not mistake enthusiasm for achievement.

MORE CLASS PERIODS FOR BEGINNERS.*

SUPERINTENDENT M. W. LONGMAN, OWOSSO.

The subject of this conference implies that secondary Latin is a problem. I have no fear that the large number of teachers gathered here will deny the implication.

It is a *problem* from the standpoint of the teacher, who is expected to crowd a heterogeneous class through a given number of pages, chapters, or texts. It is a problem from the standpoint of the pupil, who perhaps for the first time in his life is to wake up to the fact that he has only been dreaming about real application. It is a problem from the standpoint of the administrator who with high hopes watches his incoming class advance anxiously to the fray, only to come back defeated, discouraged and disheartened before having had a fair look at the object of attack.

I make bold to venture that the root of the whole difficulty is to be found not in beginning Latin, but in the beginning student. In four cases out of five, he does not really know *how* to study. Would a German schoolmaster say to his class: "You may study the advance lesson"—and then turn his attention to other duties? No, he never thinks of *their* studying the advance lesson as most of us do. They do not know how to study. They work out the advance lesson under the guidance of the master, and *there* perhaps is the secret which places the German youth of sixteen alongside of his American cousin of eighteen. Of course, the defect shows first in Latin—the most difficult subject.

Now I am not wandering from my text when I say that it should be the business of some ninth grade instructor to teach pupils *how* to study. Further-

* Presented in a discussion of the subject "Solving the Problem of Elementary Latin" at the Classical Conference of 1913.

more, this can best be done in Latin—the best taught subject of the whole curriculum. Presumably, Latin teachers should first know Latin. Herein will the colleges and universities be of great assistance to them. They should also know how to study; how to teach others how to study,—the art, if you please, of helping pupils to help themselves. Just where they can get this latter preparation I cannot answer with confidence. Perhaps some of our courses in pedagogy and psychology can be made practical enough to include it.

With teachers thus prepared, and with superintendents shrewd enough to place a premium upon them, I feel that the problem can be solved by means of an extra period for beginners—a period which shall be kept open to Latin students, just as the laboratory period is kept open to students of science—a period wherein the teacher may direct the preparation of the difficult lesson, where she may assist the laggard and keep him with the average of his class.

You ask if this will not add to the already heavy burdens of the teacher, and I answer unhesitatingly "No." If the teacher could direct the few pupils of her class who need individual assistance in some special period—preferably the last period in the afternoon—it would be economy of time and conservation of effort. We are saying much about conservation these days, and I wish to ask those of you who have watched a hundred beginners in Latin dwindle away until but fifty finish Caesar, if conservation would not be a good argument in Latin?

You ask if the plan would really take a larger per cent of the beginners through the course? I can best answer that by stating that over 95 per cent of the beginners in the school with which I was last year connected satisfactorily completed the course; and upon investigation I learned that this was no better than the average record of the classes since the adoption of the special period plan.

It would be of interest to add that in this specific case, the extra work of beginners was limited to two or three periods per week, but these periods were compulsory.

The question naturally arises: "Is not this a problem of administration, and would not the plan of the Latin teacher be promptly vetoed by the superintendent?" My impression is that most superintendents are willing to be shown, and I think if they felt that such a period was in competent hands and that the extra time would not degenerate into a period of punishment for the pupil nor a period of aimless drudgery or loafing for the teacher, they would welcome the innovation with outstretched arms.

I understand that the plan has been tried out to a greater or less extent in Joliet, Detroit and a few other schools, but with just what degree of satisfaction I am unable to say. I have had the opportunity of watching the plan for a year only, but I am convinced that it is a solution well worth careful consideration.

MODERN LANGUAGES CONFERENCE

HOW CAN WE MAKE THE STUDY OF GERMAN MORE VITAL?

MISS AUGUSTA MEISER, WESTERN HIGH SCHOOL, DETROIT.

What the teacher desires to give the pupil must be determined by the needs and demands of the members of a class. We must face the facts as they are, and adapt our theories to them. To me life efficiency is the only criterion of the intrinsic value of any study from any standpoint—be it the training of the senses, the discipline of the mental faculties, or the acquirement of culture. We should be instruments in widening to the greatest possible degree the mental horizon of each individual, giving him a tangible grasp of a larger life, a broader sympathy with, and knowledge of, all humanity. The best possible opportunity for this work lies in the teaching of the living, spoken languages of the foremost nations of European civilization, who not only open up a realm of thought, customs, manners, and accomplishment quite alien to ours, but also form today the connecting link with the civilizations which have preceded them and us. They make our Weltanschauung comprehensive. Through German we may enter a storehouse filled with many of the dominating ideas of the world along scientific, philosophical, musical, and literary lines. Life must gain greater vitality and perspective as we see more of truth and gain greater wisdom by harmonizing that which is so foreign and different with our present outlook. The more we come in close human touch with the language, and through it with the strength and weakness of a people, which has formed such an important factor in the upbuilding of our United States, the truer and broader will be our citizenship, making us willing to study and try to understand the many component parts forming our seething meltingpot. Each nation expresses its thought in its own peculiar rhythm and coloring according to the angle of its point of view, and throws its own ray of thought upon the screen of present known truth. Of the German language it is especially true that it is the tangible vehicle in which some of the greatest men of our race have conceived, embodied, and expressed spiritual messages to mankind, and the soul of these messages is found only in the rhythm of the language itself, although the sense, the mental perception, may come through translation—German, as much as any language of which I know anything as an expression of national tendency, gives out Truth not only as a mental conception, but also as an embodiment of true feeling; and when feeling gives warmth and force to mentality, there must be Light.

Thorough reasoning and accuracy should underly the teaching of German in the high school from the very beginning. One of the most con-

vincing proofs of this is gained from watching through a period of several semesters, pupils who come from German homes, where German is spoken faultily. The old mistakes, corrected over and over again, will crop out after the erroneous impression has been indelibly made. The general human failing—a lack of making real mental effort,—makes it easier to drop back into the habits of years. The same condition confronts us in the schoolroom when fluency is cultivated at the expense of accuracy, be it in pronunciation, written, or oral work. It surely is no great acquisition to our store of acquired knowledge to have at our command some hundreds of disjointed words flung loosely and glibly together without regard for the sacredness either of the sentence, the most potent human means of thought expression—or for the thought, sent thus distorted, misshapen, and weakened, into the impressionable thought world. Does not a sturdier, stronger, more concentrated current produce greater results, than the same force scattered? The gaining of additional words to broaden the vocabulary is a simple matter when the kernel is sound and healthy. Nature does all her work steadily, thoroughly, slowly. Even when outwardly she seems to take a leap, it is due to a long inner preparation. A forced growth can never stand the test of opposition or time. . . . Personally, I care very little what the beginning book is, except that it should give in the simplest, most concise, most gradual way, definite and complete grammatical steps. So many of the newer books which emphasize the so-called natural method err on this side. They cannot be used as reference books later. The facts about a single subject are scattered in various, almost haphazard, parts of the book. That conversation should be a large part of the work, that it simplifies future work by giving a vocabulary familiarized by use, is unquestioned. Any teacher, alive and thorough, works out the daily problems and fastens them in the mind by continual drill in application and countless German illustrations, sometimes used deductively, sometimes inductively, as the nature of the work demands. In this connection, it might be just if we said that much of the difficulty in German is due (1st) to a lack of understanding of English grammatical principles, and (2nd) to a lack of any conscious effort on the part of the pupil to look up an English word, not understood, in the dictionary, or to clarify a difficult English passage which demands close reasoning. It is, after all, what the teacher reads between the lines and makes the pupils see there, that counts; just as Wagner's rests are as dramatic as his most crashing climaxes. Again, the teacher of the beginning work ought to have a thorough acquaintance and sympathy with the aims of the course as a whole. Only so can the work be intelligent and effective.

Just a word here about the system of phonetics and phonetic texts so largely used abroad, and sometimes advocated for American schools. German has an almost phonetic orthography. Hence it would not seem to be as necessary for the American in studying German, as it is for the German

traversing the labyrinths of English or French. However, American teachers owe a debt of gratitude to the advocators of this excellent method, for emphasizing to them the importance of accurate oral training. The teacher of the beginning course should be familiar with books on general phonetics, as those of Hempl and Viëtor, should watch pronunciation much more carefully than is usually done, and should not abate in vigilance after the first few weeks. But, if we attempt to apply this method thoroughly in a two year course, what taste of reading or literature can be acquired? While the time allotted is so short, we can only do the best with the conditions facing us. In teaching German, as in all affairs of life, we cannot afford to be wholly swayed by any one method, a great success with some teacher, because strong personality moulds plastic and favorable conditions. We must adapt ourselves to our own circumstances, and can give only what is in each one of us with any degree of conviction. A modification of all the methods and ideas to existing conditions brings new life and interest, but imitation weakens effort and result.

We would not hit wide of the mark, if we said our central aim is to sharpen all our tools—those of pronunciation, grammar, composition, translation, conversation, reading,—so that we may strike more effectively at thought. For most individuals one language besides the mother tongue is almost a necessity to teach the value of the sentence and of the word. To appreciate the word, there is nothing like a comparison of words of similar antecedents in two languages and the study of the changes of meaning produced by prefixes and suffixes and vowel modifications. To be wideawake in detecting root-formations is a great help toward getting the thought picture for which the sentence stands. We should aim at clear pictures with sharp outlines—for long after most graduates will retain simple German conversation, if unused, long after even the power to read fluently leaves, will stand the desire to labor accurately and thoroughly and efficiently, and the habit of forming clear mental images, to be carried into the chosen life-work. . . . We occasionally today hear the criticism from outside and from some teachers, that, if the conversational method only were used, we could send out men and women capable of using this knowledge for the benefit of firms employing them. To them we might say that inaccuracy and faulty grammatical endings are usually the result of such attempts—hence such conversation could not be of great commercial value; also that schools are not in commission to give that only which will produce money for some individual. We do teach business letter forms, want ads, invitations, letters ordering books, etc., etc., for the use of the pupil in any desired way. There is a wider field than commercial fitness for the teacher to cultivate,—although this usually incidentally follows,—to get pupils interested in thoughts new and old, in following up a new idea by reading, thought, and research on their own part, not only in the language we teach, but in their mother tongue, in order to give them something tangible to

occupy the leisure hours, and thus to help to solve one of the problems which today troubles real educators and earnest parents. Only as we stimulate to earnest effort, do we aid others to live. There would not be such a cry against time spent on the downtown streets and in 5-cent shows, if children could be led early along some form of self-expression which they would have a pride in continuing to cultivate. We should try to strike the fire—that which makes the individual—then help the pupil to realize its value, and thus early begin to mould that which he has to offer to the world. This means that we have a great faith that the majority of high school pupils must have some spark, or they wouldn't be there, and wouldn't choose German, a rather difficult subject. If they haven't this spark, time and tide proves it to them and to us in that they drift to other more congenial surroundings. It is very interesting to see a pupil who has thrown some light upon a passage because of knowledge gained from some personal bent or because of greater general information, buckle down to "indirect discourse," or "unreal conditions." He wishes to appear as much of an authority on these evidently necessary evils, in order not to lose the prestige gained. Self-discovery, self-reliance, and self-criticism are good traits to develop.

The very best aid to keep things moving in the classroom, and to stimulate to the best effort in correctness of detail, is that the teacher should be mentally alert and painstaking. The objection has often been offered that it would interfere with the progress of the work to correct every error. If the pupil feels that the teacher greatly desires exactness, he will do his work more intensively and there will not be as many mistakes to correct, as if the attitude were lenient, almost apologetic. As for alertness on the part of the teacher, this can come only from thorough preparation to do the chosen line of work, from readiness for any emergency, and from continual thought and study, with the aim in view to better understand human nature, its needs, and its purpose in life. Unless we can relate what German has to offer to the life of the child, the teaching of German will cease to make an appeal, and the blow may be vital, as it has been in the case of other high school subjects. To illustrate very incompletely, but definitely: In Die Jungfrau von Orleans, the supernatural powers of Joan are always of great interest, although usually approached with unbelief in the beginning. Five or ten minutes of conversation about the telephone, wireless telegraphy, the steam boat, the engine, will show that the metaphysics of today is the physics of tomorrow. What has seemed unreal to many, has always had unquestioned reality for the German. Think of the German Märchen, Wagner's operas, such modern imaginative flights as Die Versunkeue Glocke, Hanneles Himmelfahrt, Hänsel und Gretel, etc. In another spare five minutes we might speak of how new ideas and inventions have always been, and are now, received by those whom they will benefit. Something might also be taught of mass consciousness—how it can be swayed from a position which it regards as its "rock of ages" to one diametrically opposed to this, by its

personal prejudices, its lack of balance and judgment. If the pupil will relate this to the mob in Julius Caesar, to present day political methods, to the daily press, to the shrewdness of the great advertiser, the fate of Joan and her power, will be nearer, more vital, and better understood. After the drama has been read, a day or two can be profitably spent in comparing Schiller's Joan with the Joan of history. The historical basis of any drama or story seems to throw rather a damper on enthusiasm in most cases if attacked with a scholarly attitude before the subject matter has been studied, but it lives if approached with a real sympathy and desire. The true friendship and understanding between Schiller and Goethe, and their free interchanging of ideas, also always proves of great interest. . . . Der Trompeter von Säkkingen also offers food for thought, entirely new to the pupil. The noted Schwarzwald leads to a discussion on how the German government preserves its trees; what has been done in the United States in the past in this respect; what we are doing today to wipe out past negligence; how the citizens of today are paying for the greed and financial ascendency of a few men who took advantage of the lack of knowledge and foresight of their contemporaries. There is also a chance for little talks on nature worship, the sacred animals, idols; how the term "heathen" is commonly used; how it happened that the early missionaries came from Ireland to Germany; Heidelberg castle and the university; how Werner traveled, and why he did not go to an inn; what has brought about the great city and the hotel system of today; how much travel has done to make all people more akin, so that we may have a faint dawning conception of what the brotherhood of man means; and many other points of contact, each day bringing its own. As much of this work in correlation is done in German, a double purpose is served. The opportunity for this work increases, naturally, with each semester. Older pupils, and advanced courses and texts are most favorable—but something can be done even in the beginning courses with problems not quite so intricate. When pupils begin to sense the German, the student magazine "Aus Nah und Fern," an inexpensive and good collection of idioms, as "Hier Spricht Man Deutsch," German poems, the singing of songs, the acting of scenes from the shorter and lighter dramas, the reading of stories in German, both in class, to train the ear, and at home, to gain fluency in reading and in writing German résumés, are of great benefit in giving life and color. Translation with us is almost a necessity, not only to keep track of home assignments, but because the pupil so often gives the words correctly and arranges them with true grammatical value, yet hasn't the dimmest conception of what the English sentence he thus speaks stands for. When translation is required, we can insist on thorough preparation—no forgetting of words, and no stumbling. It seems better to shorten the lessons at first, until this is accomplished. It will soon take little time from the classroom, be a background, so to speak, and need not always be called for. The lesson can then be attacked from so many angles—reading, and summing up the portions read, in German.

When the day's assignment is more difficult, German questions on the part of the teacher and complete answers from the pupil make a change. Sight translation, from the regular or simpler texts, offers great opportunities to increase the vocabulary and to gain fluency. If the teacher reads the work in the German, it is wonderful what can be done in this respect early in the career, and we thus train the ear and concentrating power at the same time. A fund of easy stories to be read by the teacher, retold by the pupil, sometimes in English, sometimes in German, according to the class, fills in odd moments. Pupils will work a little faster in order to hear a story they like that has some point. Of the daily drill, the mistakes, the disappointments, the many devices to gain ends, I have said little. We all have obstacles and hindrances, within ourselves and about us, and must make them our opportunities, as far as we can, for it is thus we grow strong. Discouragement need never quite possess us, for ourselves as learners, or for those in our charge, as even the great Goethe has said to all,

> "Vollenden ist nicht die Sache des Schülers,
> Es ist genug dass er sich übt."

CAN THOROUGH PREPARATION RESULT FROM MODERN EDUCATIONAL TENDENCIES?

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This is a scientific age in every phase of life. It is an age when the values of inheritances of the past are being weighed with a view to their retention or rejection, acording as they prove beneficial or useless to the needs of today. As a result of this great upheaval of thought which has effected especially the educational world, our public school system has undergone severe scrutiny and reform.

With a curriculum suited to the needs of society, we are told, and the so-called "new psychology" applied in working out proper methods of teaching, the public schools will be able to fulfill their function as they should. As a result, our schools are fast being equipped so that teaching can be done by the latest scientific methods, by teachers who have had scientific training. Thus, year by year, our reformed educational machine is turning out its products in the form of graduates who have been scientifically prepared for college or for life.

But our colleges are calling for *thorough preparation* and one must infer, from the amount of controversy between college authorities and secondary school men, that *thorough preparation* and *scientific preparation* are not *ever* one and the same. Disregarding subject-matter, just what is

meant by this *thorough preparation* which the college claims the right to demand from our public schools, and is it, after all, so very far from meeting the demands of society? The college certainly has the right to demand this much of its candidates for admission: a mastery of all so-called fundamental subjects; a thorough elementary knowledge of others; an ability to think intelligently; habits of accuracy, thoroughness, and concentration; an open-mindedness toward truth; and sound principles of right and wrong. If so much were accomplished by our schools, would not the demands of society be satisfied, even though the graduates might not have a knowledge of *all* the subjects now included in our curriculum? Is, after all, the absorption of a large amount of surface information in school so important to the boys and girls concerned, or to society, as the thorough mastery of fundamental subjects and the ability and a desire to acquire more knowledge after they leave school?

This haste of our secondary school educators in adopting new systems and methods seems to have become a habit. All Americans are accused of being over-enthusiastic and superficial in their judgment, and it is certain that we who teach have, at some time or other in our career, been infected with new "education-germs," by some form or other. Periodically we read of this or that person who has at last discovered the panacea for this or that problem of education, and the discovery is quickly taken up by enthusiastic followers who applaud its merits for a while, until a sentiment of reaction sets in, and we find that we are no better teachers than we were before.

We have jumped at the conclusion, for instance, that because industrial life plays such an important part in the world today, that Mary and John must be initiated in childhood into a miniature industrial world; that because there is so much more to be learned today, the curriculum must be enriched and broadened. I should like to emphasize the word *broadened.* Appearances indicate that the *broadening process* has been carried on to such an extent that there is little depth left, and our Mary and John, the average boy and girl, enter high school and are graduated from it—I say it with regret—with a scarcely perceptible coating of knowledge which wears off in a year or two.

It is not my intention, nor am I fitted, to discuss the merits of the modern curriculum in vogue in the schools. Rapid progress and change of conditions in social and economic life have brought and will continue to bring inevitable changes both in subject-matter and method. It is simply my purpose to make a few statements based on my teaching and observation of high school pupils during the last three years.

In all but a surprisingly small minority of the students under my observation, I found certain discouraging traits which, doubtless, will be as familiar to my long-suffering fellow-teachers as to myself: namely, an appalling ignorance of the elementary branches, such as spelling, arithmetic,

grammar, geography; an inability to express themselves intelligently; a disinclination to work or an incapacity for it, I don't know which; an absence of any sense of responsibility; and loose ideas of right and wrong. Of course the schools cannot be blamed for all these short-comings. Still, it looks as if a fair amount of the blame must be laid upon them, and it seems to me, if I may venture to offer an opinion, that the fault is largely due to two things: first, to the great number of studies carried on in the grades; second, to an over-emphasis on what Agnes Repplier calls in the January *Atlantic Monthly,* "our well-meant educational methods."

It stands to reason that if a child is to master any subjects, there must not be too many of them to master. The more subjects covered in a given period, the more superficial the work must necessarily be in each subject. This brings up the question—which is of greater value to the child, to develop habits of accuracy, thoroughness, and concentration, by the study of a limited number of subjects, or to give him some knowledge of many subjects but mastery of none? Would it not be better to have the necessary elementary subjects thoroughly ingrained by the time the boy and girl enter high school so that no more time need be spent on them, than to trust to luck that all shortcomings will be corrected or lost sight of in high school. It now seems necessary, however, that most high schools offer supplementary courses in arithmetic and grammar, and I have even heard of sub-freshman English. Our own curriculum has also been enlarged and each teacher is aiming to have the pupils cover more ground in her own course than was thought of ten or fifteen years ago.

The second element which seems to be a cause of poor preparation is even more important than the curriculum. In our effort to attain our new educational ideals and to emphasize practical values, we have overturned all old methods. If our much revered Froebel, for instance, could see to what an extent his influence has attained, and in what manner his theories and methods have been interpreted, applied, and improved upon by succeeding generations, would he be greatly pleased at the result, I wonder? We seem to have in these days more or less of a kindergarten system extending to the time of graduation. With the pupil ever as the center of interest, here is the duty of all teachers from the kindergarten up, according to our modern pedagogical training: study the child's individuality and seek to develop it; appeal to his interests and, once you have found them out, take them as a starting-point to arouse his interest in the proper subject. If you can do this best by a preliminary game of "tag" or "Puss in the corner," do it. School should be, according to the statement of a well-known American who is interested in children, "just one big game," with something interesting going on all the time. Further, the teacher must avoid unpleasant situations whenever possible. She must never say *"don't,"* never repress, never reprimand, but, by reason, argument, and love, she must conquer all obstacles, so that finally the child emerges from the process, a beautiful soul,

perfectly developed physically, mentally and spiritually — speaking, of course, only theoretically.

Perhaps I have overstated what is expected from our psychological understanding of the child, and yet we all know that our modern education tends toward leniency, and aims to assist the child in acquiring the necessary knowledge with the least possible effort. And this too, in an age when it is generally conceded that character is developed only by living in accordance with fixed standards, whether they may be our own or others; in an age when our greatest men and women acknowledge that the best they have given us they have gained by great and long-continued effort. Strange that we, in seeking to make children happy, deprive them of the zest of earnest effort and the satisfaction which crowns hard-attained success.

To speak in detail of language teaching in the high school from the point of view of subject-matter and method would be interesting if there were time. Many new demands are now made of language teachers, and rightly. We *should* be more efficient than was necessary twenty years ago, but why should we repeat the mistakes of the grades in attempting the impossible? That we *are* doing it, many are firmly convinced. The same criticism is made of our work that is made of the work in the grades; namely, that in the majority of cases, the work is superficially done and valueless. If the graduate goes on to college. he is kindly given one more chance to renew his grammar. mind you, I say his *grammar*. He is not offered a review in conversation to freshen up his "Sprachgefühl," or in phoenetics, or in German geography and history. We German teachers wonder why!

Please do not make up your minds that I am a rash upholder of the old grammar method. I believe with all of you that grammar should be only a means to the end. Still, I wonder occasionally, which class of students become eventually the best all-around German scholars—those who learn the language in the old fashioned way or those who learn it according to the latest approved methods written up in some of our educational journals and advocated in our National Educational Association conventions.

This brings to mind the much discussed direct method, the enthusiasm for which, by the way, is a little on the wane, because it is being superceded by the so-called *middle course*. Still, it has many devoted adherents who claim everything for it. Strange as it may seem, one hears much more said in favor of it by high school teachers themselves, by those engaged in public school administration, and by the public in general, than by university men. That, I suppose, is because our university friends (if they will pardon me) have, as usual, failed to understand and appreciate that the aim of the public school is to prepare for life and activity, and, of course, incidentally to give the people what they want. The principal value we Americans recognize in any subject may be summed up in the question: What can we do with it when we master it? Now *obviously*, the one value to be gained from studying a language is to be able to speak it. If one ever goes abroad, it

would be so useful; in meeting foreigners in a business way, one could accomplish more by speaking in their mother-tongue; if a foreign family should come to town, the language might be useful in enabling one to find out about their origin and character. Thus we are ever digging for the practical. To speak seriously, the direct method has no doubt many advantages. If there were no limit of time to be considered, and if we really needed the spoken language, it should be adopted. But such is not the case.

I have noticed with a good deal of interest that much of this advocation of the direct method as applied to German, comes from the states directly west of us, and wonder if, beneath all this talk of practical value, there does not lie a large amount of sentiment, owing to the fact that those states have a large German population. Have they really thought the matter through with reference to American needs in general?

Assuming that we aimed to teach conversation alone, in over 90% of our Michigan schools, the ability to converse would have to be gained in two years, and the work done largely by American teachers, a few of whom have had at the most a year or two abroad. There are five periods of forty-five minutes each. Assuming that the teacher used one-third of the time, an average-sized class of fifteen pupils has left thirty minutes for actual speaking, or two minutes apiece. In two years this amounts to thirteen hours and twenty minutes per pupil. This leaves out any reading of texts other than the most simple upon which conversation can be based; it also leaves out all grammatical drill. And what could we say for the result?

What then can we hope to do in two years, if we attempt to teach by this method the prescribed amount of German? I do not say that an exceptional teacher might not make a success of it, but it's like an insurmountable task for the rank and file of us.

An intelligent woman told me the other day of her experience in studying French by the direct method. I asked, "What did you learn?" "Very little," was the answer. "Those who were good bluffers got along fairly well, but the rest of us who were timid, kept quiet because we weren't sure of how the thing ought to be said in French." She spoke also of the impossibility of getting at one's tongue's end the vocabulary necessary for each lesson, and of her failure to learn anything about French grammar.

Is it any wonder that we, as teachers of modern language, are somewhat bewildered, and that our pupils, to use their own expression, are somewhat "muddled?"

The profession of teaching is today a precarious one. We, as teachers, cannot get away from the babel of voices urging change and reform. There is danger that we be carried along with a current that will land us nowhere, and it will be well for us if our training serves us here in good stead, if it makes us conservative and keen to distinguish between enthusiasm and sound common sense. The one thing which remains for us to do, while outside influences are doing their utmost to undermine all established ideas,

is to weigh, consider, and experiment wisely, before dropping the old for the new. It would be to our shame if we did not stand for the higher and vital things which the people in general fail to recognize. All that new methods are seeking to accomplish—and more—can be accomplished by the power of personality, the extent and influence of which has no limit and can never be measured. And to exert this power, it is necessary that we *be* personalities, with all wavering impulses and desires brought into subjection and harmony, so that, without distraction, we can bring all our intelligence and wisdom to bear upon the task which is ours.

ENGLISH CONFERENGE

INTERPRETATIVE READING AND LITERARY APPRECIATION.

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(As it is impossible for the printed page to record oral expression, all vocal illustrations have been omitted from the following.)

Literature, if properly taught, is one of the most vitalizing factors in our educational system. It gives life vision, insight, and breadth. It makes our experiences larger, richer, and more abundant.

The record of literature is the printed page—paper and ink; dead, inanimate things. The printed page contains no beating of the heart, flush of the face, flash of the eye, or ring of the voice. It is silent and lifeless. It can live again only through the understanding, sympathy, and imagination of the reader.

The problem of literary appreciation and of oral interpretation is the problem of re-creating within ourselves the life which the printed page so vainly seeks to record. Unless a poem is born again in teacher or pupil, it cannot live. This problem is not historical, philological, or critical, but spiritual. We may know names of poems, and masses of critical comments, and yet not know the poems. The other day a student asked if Shakespeare or Bacon wrote Macbeth. Such a question may be interesting, but it has nothing to do with the appreciation of that play. "The play's the thing." If we want to appreciate literature to the fullest extent, we must live again the thoughts and feelings that stirred men like Shakespeare, Tennyson, and Browning. How may this best be done?

First, we must understand words, conditions, and moods. Dictionaries and other helps should not be ignored, and we should ask ourselves such questions as, "Who is speaking?" "Under what circumstances is the speaking

made?" "To whom is the speech addressed?" and "What is the mood of the speaker?"

Second, our approach to literature should be friendly and sympathetic, and not critical and fault-finding. If we go to Eugene Field and say, "Now, Mr. Field, that poem, 'Boy Blue,' is too sentimental for me," how much do you imagine Eugene Field will tell us of the depth of human sorrow and the eternity of human love. If we go to Tennyson with the borrowed criticism that his "Maud" is mud, our eyes will be so full of the mud that it will be impossible for us to see the beauty of Maud and to feel the redeeming power of her love. We should avoid the cold, impersonal, arm's-length attitude towards literature. If we take Hamlet's first soliloquy and hold it away from us like a laboratory specimen to be examined, classified, and put on the shelf, our reading will be "weary, stale, flat and unprofitable." If we want to appreciate literature we must not keep it in a book at arm's lenth, we must put it inside of us and let it work.

Third, we must try to quicken the imagination—that power of the mind that takes our little experiences, and mixes and magnifies them, changing them into new and larger ones. We must train ourselves to see and hear and feel, more vividly, things that do not actually exist. For example, as we read Grey's Elegy we must put ourselves outside of the class room, beyond the printed page, into the old English country church yard at the close of a summer day; there to hear the curfew as it slowly tolls the knell of parting day, to hear the lowing cattle and watch them wind their way over the grassy meadow, to see the plowman homeward plod his weary way from his hard day's work well done, to watch the glimmering landscape fade and twilight change to dusk, and feel the solemn stillness steal over the world—that hushed and peaceful time of day when God seems closer to the earth; there to be alone with night and moonlight shadows on the mouldering heaps where

> "Each in his narrow cell forever laid,
> The rude forefathers of the hamlet sleep."

Only by identifying ourselves with this atmosphere through the power of imagination can we fully appreciate the thoughts of this poem. As we read Browning's "Evelyn Hope" we must try to feel the sad, silent strangeness of the death chamber.

> Beautiful Evelyn Hope is dead!
> Sit and watch by her side an hour,
> That is her book-shelf, this her bed;
> She plucked that piece of geranium-flower,
> Beginning to die, too, in the glass;
> Little has yet been changed, I think:
> The shutters are shut, no light may pass
> Save two long rays through the hinge's chink.

Whatever we read demands the same kind of creative immagination as that which the author possessed. The same creative impulses are needed for the appreciation of literature as for its production.

Fourth, the fullest appreciation of literature demands good oral interpretation. Expression completes impression. The very act of reading aloud concentrates the attention and intensifies the thought and feeding. Read a poem silently many times and then read it aloud and it takes on new meaning. This is because our language is an oral language; made to express in sound the infinite variations of thought and feeling; full of time, melody, tone-color and music, subtle influences which the printed page cannot record. If these things are not essential to thought and feeling, then let us write Tennyson's "Sweet and Low" in plain prose. It is just as impossible to express the delicate variations of thought and feeling by the silent page as it is to paint a summer sunset in charcoal. After the murder of Duncan, Macbeth says to Lady Macbeth, "I have done the deed. Didst thou not hear a noise?" This may be read in many ways for which the printed page has but one record. The printed page cannot record the spoken word. The imagination unaided by the voice cannot create it. Only by voice and action can the most intense and the most delicate shades of thought and feeling be appreciated and revealed.

The greatest need in the study and teaching of literature is teachers who can read well, and who can teach others to read well. Reading in the classroom makes or mars literature. Beecher once said, "Many a sermon is the funeral of a good subject." Many a reading has been the funeral of a great piece of literature. Reading aloud is an immediate and adequate test of appreciation. It reveals more in five minutes than can be discovered by questions in half an hour. A young lady read from Tennyson's "Lady of Shallot," "And there the surly village———churls," indicating that she was too careless to find out the meaning of the word churls. A man read from Browning's "Give a Rouse," "King Charles, and who'll do him———right now?" indicating that he did not know the feeling of the speaker towards King Charles. The trained teacher can tell at once whether or not a student appreciates what he is reading.

We cannot consider today the technic of good reading. Reading, in its higher forms, is an art, equal to the art of music, painting, and poetry; demanding insight, sympathy, creative imagination and skill. We can all dabble in water colors; we can all utter words; but in our attempts to teach literature, this most important of subjects, let us not be content with drumming on our vocal organs as a child drums on the piano. Let us add good reading to insight, sympathy and imagination, as a most important factor in literary appreciation.

SHAKESPEARE IN THE HIGH SCHOOL.

DR. H. S. MALLORY, UNIVERSITY OF MICHIGAN.

[INTRODUCTION OMITTED.]

To begin, let me quote some recent student opinions concerning the study of Shakespeare. A voice from the sunny southland says:—

"I feel if many people had the courage of their convictions, they would not place Shakespeare as the ideal. It seems stylish to say, 'Shakespeare is my favorite.' At the same time I always felt that there were a lot of other things from which more profit might be derived."

A voice from Michigan: "I read the *Merchant of Venice* while in the eighth grade in connection with English grammar. I did not receive much instruction from the teacher. We read it to learn English."

A voice from New York: "The life of everything was beaten out of my study of Shakespeare. We parsed it and analyzed."

A voice from the Michigan metropolis: "I think that a teacher who honestly enjoys Shakespeare, not trying to make believe he does, is a rare and scarce article. If a teacher likes to read and re-read these plays, then he is the one to teach Shakespeare. If a teacher pretends to enjoy so much anything that has a hint of Shakespeare's autograph, when he really does not, then a deep-seated hatred for Shakespeare is instilled in the brain of the student. ...... I haven't as yet been able to rid myself of that feeling of revolt when any one mentions Shakespeare."

From the Michigan capital: "The teacher seemed to have a knowledge of Shakespeare equivalent to that of a careful high school student, in one case. In another, I had a very intelligent teacher, especially learned in Shakespeare. For me, I might be a type, the study came too early. In high school I never appreciated Shakespeare like I do Browning now. The teachers almost spoiled him for me. Some time every one has a desire to extend his knowledge. If the desire to study Shakespeare has been killed in his school days he will probably never read it. To me the study of Shakespeare in the high school in the condition and frame of mind of the students is harmful to the student. It is just like trying to expound Newton's *Principia* to a group of people the average age of whom is sixteen years."

Again from Michigan: "In studying we adhered closely to a text-book containing notes like our *Cicero* and *Vergil*. We studied *Macbeth* and *Merchant of Venice* in our second year. This study came too early for profit. I have never cared to read Shakespeare since that time, any more than I have cared to read Cicero's orations. Shakespearean characters appear too much like mythological beings to the high school student. A

good foundation of ancient, mediaeval and modern history should be obtained before he studies the plays."

A protest from Pennsylvania: "There is no doubt in my mind that the teacher knew Shakespeare well and did really enjoy reading it, but the plays were picked to pieces and I therefore did not enjoy studying them."

Michigan continues: "The instructor was mercilessly bookish. His attitude was icy. He was also analytical—but this proved to our advantage for he took great pains in analyzing all moods, motives, results, and expressions. Being bookish, he made the study sometimes ponderous and heavy. The first plays I read chiefly for the beauty of the verse. Later I began to study characters and the philosophy they teach. I believe the beauty of the language and descriptions appeals to young students, tho they may not be able to appreciate the characters. I have tested this out on my younger brothers and sisters."

Chicago reports: "The plays were read aloud in the class room and thoroughly discussed; many important parts were memorized (the student being allowed to make his own selections); character contrasts were discovered; differences of interpretation were argued, related historical facts were studied. Besides this an outline of each play was prepared, and the notes in the text-books thoroughly studied."

From the Northern Peninsula: "I think it is a good plan to have pupils learn parts of the plays. Some of the soliloquies in *Hamlet* run along the same vein as do the thoughts of many people of high school age, and are therefore doubly interesting. Making the plays answer questions in real life and drawing comparisons between their characters and those met by the pupils in daily life make the reading more interesting."

From a township school in southern Illinois: "We studied *Richard Second, Henry Sixth* and *Henry Eighth* in English history course, and six others in English literature. All the plays were read aloud in class. *The Merchant of Venice* and *Julius Caesar* were acted before the school by members of the class. I think the plays came too early to appreciate them fully, but I believe it is good policy to push everything some. The acting of parts as it is done hurriedly in class and without any interpretation of the feeling of the play is not important, only that it does create an interest in the play for some students.

Another voice from Michigan: "We took up *Julius Caesar* in first year high school and *As You Like It* and *Macbeth* in fourth year. Required reading outside of class in senior year included *Lear, Midsummer Night's Dream,* and *Hamlet.* We were questioned on outside reading only to see whether we had done it. The plays taken up in class became quite clear, but those read outside were somewhat obscure, probably because too much was assigned at a time or the mind was not mature enough to appreciate the character relations. I got sick of it all after awhile. I would recommend postponing the study of Shakespeare until college."

From Wisconsin: "I got more out of the study of *Macbeth* than from any other of the plays, for the reason that we spent two months on it. This led me to conclude that most of the plays were skipped over too hastily."

Michigan again: "My teacher put too much emphasis on details, and knowing the exact meaning of every word, which rather obscured the larger meaning of the sentence or speech. She added interest by giving the exact historical background, where there was any. She was also apt at catching the subtleties of humor."

Michigan introduces a phenomenal young lady: "I read nearly all the plays before I was nine years old. I was simply wild to read, and *Shakespeare's Complete Works* was one of my favorites. I gained no real knowledge of the plays; it was purely the music of the verse that attracted me. In high school I enjoyed the class discussions and certainly felt no antagonism toward the plays, but there were so many other things to study outside which I preferred to Shakespeare that I read no more than was absolutely necessary. If I were teaching Shakespeare I should obtain an edition that contained no notes. Most of us have a little imagination and I think authors ought to recognize that fact. My teacher was quite apt to take quiz questions from material given in the notes. I used to wonder sometimes which was the most important part of the book, that which Shakespeare wrote or that which some unheard-of man who arranged the edition wrote."

Michigan tells how she does it: "It was in the senior year of high school that our real study of Shakespeare took place. A cast was chosen for each act, the parts memorized, and the entire portion acted out for the benefit of the assembled class. Well do I remember the murder of Banquo in *Macbeth,* as two of the larger boys—both football players—fell upon their unfortunate victim and folded him up by the radiator. Macbeth's soldiers were quite real, as three fellows armed with feather dusters marched and counter-marched at the rear of the room during one of the scenes. All of this did not render our study less serious but only served to add a little spice and zest to it all. The last year's study was conducted by a man who thoroughly enjoyed Shakespeare, saw the beauties and applications to modern life in the plays, and was prepared to bring his pupils into the same happy frame of mind. Shakespeare's words, character relations, and plays as wholes were rendered very clear to us. This was due to the fact that a great deal of time was used in the study of a single play. School study made me deeply interested in Shakespeare's plays."

Michigan continues the topic: "The method of studying Shakespeare was very effective. Each recitation the cast of characters was announced for the next act or a number of scenes. We then had to learn our parts and during the recitation period give the act as we thought it should be given. The rest of the class acted as audience. Our performances were very good considering that we had nothing at all to help make them realistic. Of course, curtain sticks served as swords and red ink as blood, but that was

all the help we had. After we had rendered a part in this manner we took a period to discuss it and be quizzed on it. I do think that in many high schools pupils are forced to study Shakespeare when they should be reading *Ivanhoe*. But in the senior year most of the pupils are advanced enough to study and understand Shakespeare. We had to study Shakespeare's life and become acquainted with him first. Then we felt we knew him as the man when we took up his works. Towards the last of our study of Shakespeare we did not have time to memorize parts, so then we read them instead. But we had to be up in the front of the room (on the stage) just the same. We had to be Macbeth if we were reading his part, and when any one fainted in the play, we fainted."

I stop the quotations for a moment to remark that the case of the students might be rested just here; but I cannot resist the temptation to give one young man's statement of the ideal method of teaching Shakespeare. The gist of it is in one tremendous sentence, followed by two little stubby ones for it to stand on.

From Ohio: "There is a great deal of history and physicology brought out in Shakespeare's works and I think if a student was made to feel that Shakespeare was a man, to be sure he was a highly educated and remarkable man, but I think if the student is first made acquainted with Shakespeare himself and what prompted him to write his plays and conditions of the time, and thus while the student is reading the play these things should be constantly brought to mind. This can be done by the question method. Giving a student a number of questions each day for the next day's assignment."

These opinions have now reminded you what the college man is, and if in return for what he has been remarking concerning his teachers you wish to call him names, you can hardly do better than follow the lead of that distinguished son of Michigan who pays his respects to the "Man of Argos" on the one hand and the "artless Bandar" on the other. But what these students are is the result of heredity and environment, and you yourselves have been a dynamic part of the latter. However, you need not be too downcast over the outcome, for other influences have been mighty and various, many of them directly counter to yours. Your worst foe has been the lure felt by these young persons of phases of life as yet untried, novel, even perilous. The young men and women who come to the university as freshmen have in many cases already been through an experience of life that could not have been matched by their grandsires at seventy. Also, for the most part this multiform and absorbing experience has been lived through in those years when you were trying to rouse their interest and fill their minds with theories of quadratics, contrary-to-fact conditions, split infinitives, the nature of gravity, how Chaucer shaped the English language, or how to acquire a literary style before you have any power to organize ideas. It is not amazing that their big or little plunges into real life proved the more absorbing. Let me mention a few of the things they were doing.

I have this year one student who was once lost by night on the very verge of the active crater of Kilauea, with lightly crusted lava holes all about him. Another has worked in the Culebra Cut. One girl has spent tranquil years in a private school in Germany, with vacation trips to all the famous spots of Europe; another has done slum work in Philadelphia. One boy has driven an automobile in a race, when every turn of the road might prove a death trap to himself or a competitor. Several have been reporters; others have earned very hard cash as book-agents, or as helpers in lumber camps or hayfields, groceries or city offices. One was rescued after a long night on the roof of a house when the flood had driven him out of the second floor; one has shot his moose by moonlight. Some have tried hoboing, or cowboying, or marrying, or even teaching. All of them have passed through the hands of yourselves or of high school teachers in other states, and yet come to me still cherishing illusions, enthusiasms, ideals—along with their love for cigarettes and vaudeville. One youth had of his own accord read *Paradise Lost* fifteen times before a careless college instructor assigned it to him. Some have carried golden spoons in their flabby mouths, while others have known what it is to be penniless and hungry. Some have got religion; some have lost it. Some have been in love, really in love. Not a few have seen the face of comrade or father or mother sink into final marble.

The point for us to recognize is that nowadays the boys and girls in our high schools do not regard themselves as being prepared by us to live life, but rather as actually living it, in spite of the distraction and encumbrance of the lessons we continually assign. How, then, are we to work out our first pedagogical problem, that of creating and maintaining interest in the subject matter we have to present, the principles we should inculcate? How interest this cocksure, omnivorous, perversely assimilative, protean creature who sees himself acting in the living present and regards us as concerned chiefly with exhuming the dead past? I wish I were qualified to give anything other than a general answer to this question, but when it has come to the individual case and the crucial moment I have failed many a time, like the rest of you. Yet we all recognize that the working plan is to try to make the student realize the relations of what he is required to study with life, with his own life as it is or as it may and ought to be.

Now in Shakespeare it is easy to find abundance of that "more life and fuller that we want." Surely to love and grow to know him is a liberal education, and well might we beware of the man of one book, were that book *Shakespeare*. Despite Tolstoi's arraignment, practically every character in the plays can be brought to the test of life as we know or can readily imagine it, can be shown true to life somewhere, somehow, for good or ill, laughter or tears. Your school-boy has so far found his dramatic ideal in the wild west play of the "movies," and your school girl feels her spirit swoon upon the rhythm of rag time and tango, yet he is a poor teacher who cannot arouse in these reluctant pupils a real interest in Shakespearean

plot and character. Touchstone, Bottom and Malvolio, Ariel and Caliban, Portia, Viola, Rosalind, Juliet, Brutus and Hamlet, not to name a hundred others who are less talked about but real to the core, these can be revealed in sufficient measure to command sympathy from any normal high school boy or girl. And you have gathered from my talking-pictures that the music of the verse ,the radiant touches of description of the natural world, the "swallow flights of song," too, exercise a sort of natural magic upon these young people who in spite of themselves are enamored of all sensuous beauty.

Nor will the spiritual beauty escape them, if the teacher is alive to it. Here are those countless profound or poignant utterances that spill from the lips of Shakespeare's kings or beggars, his unlessoned innocent maids or world-worn fighters, upon which the teacher may dwell with unfailing effect. "We needs must love the highest when we see it,"—and here it is glimpsed under "a thousand purple forms." Unconsciously the pupil will store these in his memory, to become touchstones for him in all his dealing with self and men; they will become blocks in the foundation of his philosophy of life which in these enthusiastic, idealistic school days he is building up, far more wisely, if rightly guided, than he knows. Here in the great plays, in myriad concrete forms as well as in matchless abstract utterance, will be found more abundantly than in any other single piece of world-literature save only the Bible "that noble and profund application of ideas to life which is the most essential part of poetic greatness." And the pupil can be led to see that not only the greatness of a poet but also the highest efficiency of any man in his everyday career "lies in his powerful and beautiful application of ideas to life,—to the question, How to live."

How the great aphorisms throng upon one's memory, and hearten one for the beginnings and endurings and endings of things!

"I dare do all that may become a man;
Who dares do more is none."

"Men at some time are masters of their fates:
The fault, dear Brutus, is not in our stars,
But in ourselves, that we are underlings."

And yet, "There's a divinity that shapes our ends,
Rough-hew them how we will."

And, "The gods are just, and of our pleasant vices
Make instruments to plague us."

"Cowards die many times before their deaths," yet he who, like Macbeth, has wrung himself dry of the milk of human kindness and caught "the nearest way" shall find in the end that life as he has lived it is but

> "A tale
> Told by an idiot, full of sound and fury,
> Signifying nothing."

And if the din and dust of the streets seel ear and eye, so that when asked to read of these characters who live only in the realm of imagination your pupil replies, "I have been going to and fro in the real world having experience, and I am in haste to return for farther and wider journeyings and more experience still," Rosalind has furnished you with answer:

"A traveller! By my faith, you have great reason to be sad: I fear you have sold your own lands to see other men's; then, to have seen much and to have nothing, is to have rich eyes and poor hands."

"Yes," returns the nomadic Jaques, "I have gained my experience."

"And your experience makes you sad: I had rather have a fool to make me merry than experience to make me sad; and to travel for it, too!"

Not that I believe this to be the whole answer: Tennyson's Ulysses, for example, suggests something more. And to the teacher of composition like myself nothing is more continually patent than that these high school and college students, whose record of deeds done so thunders in the index, have not so much had experience as experience has had them. The diverse and astounding things they have been through are not ordinated in memory, not viewed in perspective, not evaluated. Even the record of them in the bodily tissues seems fortuitous, helter-skelter, graven deeply or shallowly without regard to intrinsic significance. The student prates of seeing life. Retort that the places and people he has known, the deeds he has done, the hopes and projects and deprivations he has felt, are really life and the stuff of racial history and of poetry, tell him therefore to select experiences and clothe them in word, insist that he shall "look in his heart, and write"—behold, he finds pilot and captain of a lordly craft, all but master of the sea; he begins dimly to realize that wind and current have made him go hither and thither, and the going has been all. Let the teacher drive home his need of a chart for earth and sky; let her prove to him that it is a light from the despised past that must shine from behind him upon the path into the future; let her aid him as she can with knowledge, ideals, touchstones, and a philosophy of life. She is fortunate if the works of Shakespeare be the means allowed her for the work.

And yet I wish the study of Shakespeare might be confined to the last two years of the high school course, even though some pupils would by this time have dropped out and so must miss it entirely. This for two reasons: first, the chances for effective instruction would thus be increased, since the specially prepared teacher is more likely to be obtained for the advanced

classes, and second, the pupils, being now less immature, can be interested in a greater variety of matters incident to the plays and can comprehend more vital facts, profounder truths. Something of *The Merchant of Venice* and even of *Julius Caesar* can be imparted to pupils in the eighth or ninth grades, but how little, compared with what they might gain a few years later! Also, for varying reasons quite well known to you, I should rule out from the high school, whether for class work or for outside reading, certain of the plays which I now find assigned more or less generally. This list would include of course *Othello, King Lear, Antony and Cleopatra,* and *Romeo and Juliet,* and I think *Henry IV, The Winter's Tale, Much Ado, The Merry Wives,* and *Cymbeline.*

With regard to the teacher and his equipment, it is easy for you to draw profitable inferences from the somewhat conflicting student testimony which I have quoted at large. In the first place, the teacher who is not truly interested in Shakespeare ought somehow to avoid being obliged to mediate between Shakespeare and the impressionable, too-easily-prejudiced pupil. The determining of a deep-seated like or dislike for the greatest English mind is a grave matter.

Again, if some one whose spirit is willing knows himself to be poorly prepared for actual teaching of the plays, he should not let another long vacation pass without assiduous and planful reading and study. He should, of course, first read and reread as many of the plays as possible. Informative history, elucidation, and criticism of the plays and their period are everywhere available. The best fact-book in small compass is that recently issued under the appropriate title, "The Facts About Shakespeare," by Professors Neilson and Thorndike. Of another sort is the little volume entitled "William Shakespeare," by John Masefield—brief but suggestive talks about the dramas by a poet and dramatist. There are several well-known works dealing with the manners and customs of the Elizabethan people, and valuable surveys of Shakespeare's London. For the great out-of-doors that so graciously inarms the plays, as well as for the country sports that Shakespeare loved, nothing could well be more illuminating than "The Diary of Master William Silence," by D. H. Madden of Dublin University. There is Shaw's sportive play dealing with Shakespeare and that Dark Lady who has given rise to so much unprofitable speculation. A serious dramatization of the theme by Mrs. Munn, entitled "Will Shakespeare of Stratford and London," has certain pleasing and suggestive scenes, though revealing little of the poetic gift or the imaginative reach of Mrs. Marks or Mrs. Dargan. The drama "Marlowe," by the author of the exquisite and truly dramatic "Piper," gives us a further glimpse into the life that Shakespeare shared with his great contemporaries, as does of course "The Tales of the Mermaid Tavern," of Mr. Alfred Noyes. I have not myself been able to read "Will Shakespeare's Little Lad," by Imogen Clark, but I include it here on the commendation of Dr. Furness, among others. Even Kingsley's "Westward

Ho!" may be worth rereading for its presentation of the Elizabethan age from a different angle. And lastly, if you are interested in Shakespeare problems, you may read "The Man Shakespeare and His Tragic Life Story," by Mr. Frank Harris, though I trust you will not yield unqualified assent to the triumphant identification of the supposedly inscrutable dramatist with certain of his own characters.

Finally, as to special methods. It would be presumptuous and foolish in me to try to tell any one of you precisely how to impart a particular play or passage to a particular class. Nevertheless, I will tell you in a general way what I believe in and have attempted to practice. First, insist upon the pupil's comprehension of the plain, if not also the profound or esoteric, meaning of every important passage, of every key word or phrase. What does that statement mean? is my primary question, for the first step in poetic appreciation is intellectual grasping of an idea—not a guess, neither a wavelet of undefined sentiment propagated through homogeneous protoplasm. I insist upon word-study just so far as it conduces to the answering of this question, making it clear always that not the word in and for itself concerns us, but the word as sole means of putting us in possession of the thought of the character uttering it.

My second objective is the plot of the play—enveloping, antecedent, main, subsidiary. Pupils rarely have difficulty with the main story, but the relation of sub-plots is for them frequently obscure. I should make clear the exciting force, the climax, the denouement, the elements of suspense and relief. Each act, each scene, can usually be presented as the drama in little. with its own introduction, rise, and fall. The precise dramatic purpose of every scene, indeed, of every speech so far as time allows, should be ascertained; the causal nexus continually insisted on—here is one of the connections with real life. Elizabethan stage conditions, so far as they are reflected in the plays themselves, should be made clear.

The characters, in their individual and typical aspects, their inter-relations, their unfolding or development as they pursue their own ends with the means at hand, can easily be made of absorbing interest to practically all students. Whatever parallels can be established with the careers of real men and women, whatever illustrations drawn from human life today, are welcome.

The memorizing of passages, not necessarily the long and more famous speeches, but passages musical, radiant, or weighty, of whatever length and usually of the pupil's own choosing is worth while. For the more important scenes I should assign roles to different pupils, to be carefully studied beforehand and then read aloud in class with understanding of the sense and as much of dramatic expression as possible. The student taking a given role should be subject to serious quizzing by his classmates upon anything germane to it. I should not encourage the attempt to act out scenes in the class room. Certainly I should never permit pupils to make helmets out of

flower pots, swords out of curtain sticks dripping with red chalk, nor drums out of water pails. But if my time and strength permitted and the class had responded according to expectation, I should give a public or semi-public production of parts of the plays once in a semester. In this I should enlist as many individual students as possible, even if to do so I had to change the cast for each scene or act and endure some very bad acting here and there.

These, then, are some of the things that I should attempt, some of the means to which I should resort—but the chances are that any considerable measure of success would come to me only in that larger day.

"When each for the joy of the working and each in his separate star,
Shall draw the Thing as he sees It, for the God of Things as they are."

THE MIRACLE AND MORALITY PLAY AS A THEME FOR HIGH SCHOOL STUDENTS.

MISS MARTHA E. CLAY, GRAND RAPIDS HIGH SCHOOL.

If love of the ideal, the mystical, still lingers in the hearts of our high school students (and I think this side of their interest crops out almost every day), does it not seem fair to assume that any form of writing which deals with this spiritual side of life will appeal to them, and that, if they are writers at all, they will write on such themes well? This leads me to my subject—Miracle and Morality Plays as a form of dramatic writing peculiarly adapted to High School students because of the stress they lay on the mystical, the ideal.

That dramatic writing of all sorts is of interest to students in the Grand Rapids High School is due to the Drama League of that city. For three years the Drama League has offered a first prize of $7.50 and a second prize of $2.50 for dramatic composition written by High School students, and has made a list of ten worthy of honorable mention. It was as a result of these contests that the ability of High School students to do exceptional work with the morality play was brought out. The play winning the prize last year, "Loss and Gain," was written by Glen Pettis, a sixteen-year old Junior. The judges, who were members of the Drama League, not only gave the play warm commendation, but sent it to Charles Rand Kennedy, the author of "The Servant in the House," for criticism; and from him it won high praise for its rhythm and cadence, but particularly for its spiritual vision.

The play, "Loss and Gain," tells the story of a certain Richman who, counselled by Greed, his servant, has hardened his heart to the appeal of

Charity wailing at his gate. Death calls him, and then Conscience (whom he has repulsed before) reminds him of his sins and urges him to pray for mercy. His former friends, Pride and Worldly Wisdom, can give him no help so he turns to God. I quote this prayer.

"Richman: Oh Eternal Spirit, Thou Only God, Being above all earthly things, embracing all, supporting, ruling o'er, Thy splendor fills all space with rays divine. Heavens unnumbered, hosts multiplied by millions, are but an atom in the balance weighed against thy grace. What am I, then? Nothing—Oh God, control my spirit, guide my heart; though I be an atom, still by thy hand am I fashioned; a monarch over dust, a slave, a worm, a sinner, yet do I feel thy presence. A blind and helpless sinner am I. Oh Lord, forgive me. Heal my mortal blindness. And when my tongue no more can pray, let my soul speak in tears of gratitude."

The play has been given twice successfully in the auditorium of the Central High School under the able direction of Mr. E. J. Eaton, the head of the work in public speaking, and a magician in the art of dramatic production.

The Miracle and Morality play is best studied in connection with the work in English literature. In our school this comes in the eleventh grade. Much foundation work in dramatic writing has been done in preceeding grades in the form of monologues, dialogues, and dramatization of fairy tales; and from this we build. This particular semester, beginning with Beowulf and culminating with Macbeth, provides a study of the systematic development of the drama; and most of the outside reading done, as a natural accompaniment to the course, assists in teaching the pupil dramatic writing.

Our foundation stone for such plays must, of course, be the Bible, for here alone is to be found the substance of the Miracle play and the ideals of the morality. Our first outside reading is the Gospel of John. Our excuse for bringing in this forbidden book—the Book of books—is that Bede translated it; our reason, beside the fact that we must have subjects for the plays, that exposure to Biblical language is the most potent invigorator of English writing. Very little reading from the Bible can be done, however, for its unfamiliarity makes it tremenduously difficult. It is safe to say more fail in their Bible test on such questions as "Who was Judas?" and "Why was Thomas called the Doubter?" than on any other test on outside reading. It may not be possible to teach the Bible in public schools, but for the sake of our English composition, I wish it were customary for parents to read it at home, so that the eloquence of the King James Version might not need watering to the density of the Modern Reader's Bible. This Bible reading is never discussed in class but its value to the morality play is illustrated by the fact that Glen, the author of the successful play, has been since the tenth grade when his teacher, Miss True, suggested its value to him, a student of the Bible, particularly from the point of view of its literary style.

Next we read a number of old ballads and acted one or two very informally to show how full of action they are. One boy as bard read the outside part, the characters meanwhile acting in pantimime or speaking when their turn came. Those who have seen the Fuller sisters of England this past winter, in their singing and acting of old ballads, will understand our method. A couch cover made a fine Beggar's cloak, a pointer served for his staff to lean upon, and a screen was a castle in one play and a river to throw a sister into in the other. The acting was impromptu and spontaneous, but very thoroughly enjoyed. Next day the students dramatized a ballad, and so were initiated in Junior work in dramatic writing. Next we take up the romances and the stories of some, *William and the Werewolf, King Horn, Gawain and the Green Knight, Reynard the Fox,* not only bring out the beliefs of long ago but help to show what is meant by action. By this time we are ready to study the Miracle and Morality plays themselves—the most modern as well as the earliest form of English dramatic composition. The students do not read the plays of the fifteenth century unless they choose, for it is thought these are more suitable for college work, but instead Modern Miracle and morality plays are assigned for outside reading and the stories of them are told in class. These plays: *Passing of the Third Floor Back, The Servant in the House, Everywoman, The Travelling Man, The Hour Glass, The Terrible Meek,* and *Joseph and His Brethren,* give them the spirit of the old play and the teacher's reading of *Everyman* or *Abraham and Isaac* brings out its simplicity and straight forwardness. Just before we take up the study of *Macbeth,* which is the culmination of our course, I think it is well to read them Marlowe's *Dr. Faustus,* with the horse play left out. This is neither a Miracle play nor a Morality, of course, yet it seems to me it combines both, for it is a study of the soul of man—the Morality play—and it teaches man's responsibility to God, the keynote to the Miracle play.

While they are reading *Macbeth,* in which they learn more about the methods of character development than from anything else they have had, as well as what a perfected play means, they each write a play. Some subjects that have been chosen are *Joseph, Ruth and Naomi, The Prodigal Son, The Ten Talents, Saul, Every Girl, The House of Pride, The Two Trees.* Some teachers have the teaching of these old stories transferred to a modern setting. If the students do not care to write either a Miracle or a Morality play, they can choose a fairy tale or whatever appeals to them more. For I do not mean that all can write these plays. No, rather that in such plays some can stretch their wings to such high flights that they give to us a glimpse of the ever living faith of youth, that sweetener of the world. The others at least get to see the possibility of a good play and to realize how far the average "Movie" has fallen from that high estate. And this last is quite as important, for it seems to me that one of the best things a teacher can do is harness Pegasus, and so make ideals uplift every day life.

THE SHORT STORY IN THE HIGH SCHOOL.

MISS EDITH SHAW, ANN ARBOR HIGH SCHOOL.

The short story is peculiarly adapted for use in the high school. Every student who has read anything has spent two-thirds of his time on stories that are brief. At the outset then, he begins the class work feeling that here is something which has been tried and found interesting. It is a comparatively easy task to extend this interest and to arouse curiosity in the elements which determine that one story shall become permanent literature and that another shall never be heard of after the current issue of its magazine is exhausted. The type then has the advantage of being familiar; the same is true of the material. In many of our best short stories, the subject matter is familiar to the point of being commonplace. Once arouse the boy or girl to a consciousness of this and he has a new and truer standard for literary material. He sees the possibilities in the world immediately at hand and has learned the valuable lesson of "the beauty in the commonplace."

The construction of a true short story also adapts it to high school students. It is short enough for one day's preparation to provide a bird's eye view of the whole. The student comprehends with comparative ease the problem and its solution. The absolute and definite technique aids in making this possible. There is a good deal of truth in the saying, "No building was ever erected so closely compacted or with every part doing so perfectly its work as is the case in the best short stories." They are models for training in accuracy of observation and therefore in truth of interpretation. Definite study along clearly marked lines gives to the student the ability to understand and appreciate literature. This means a new attitude—instead of indifference or superficial interest in the succession of incidents, we shall discover a mind alert to the beauty of the well planned whole. The novel provides somewhat the same material but because of its larger number of interests and therefore more complicated involvement, the difficulty of securing a clear, definite understanding, is increased. The short story has the elements in a more usable form for the early work in the high school.

I understand from the chairman that I am expected to explain the method used in the study of this type of literature. It must be understood that this plan is in the process of evolution and whatever is said today concerns simply the present stage of development. The only good reason justifying its presentation is the hope that a discussion may call forth valuable suggestions.

I must state at the outset that I am a firm advocate of as accurate and thorough work in an English class as in a class in Mathematics. Definite knowledge and its definite application must mean greater appreciation of art and beauty since true appreciation depends so largely on orderly thinking. "Beauty in literature is not something added from the outside. It is

in the framework of the whole. It is the product of adequate thinking." Judging from experience, I have come to see that the pupil who appreciates literature with the keenest, most conscious pleasure, is the one who knows what to look for and what is meant by the truly fine in the work under consideration.

For the past two years, an outline has been used in studying the short story. The points in the outline have furnished the details to be considered in judging a story. The first assignment is to read the selection as if it had arrived on the library table within the covers of the last magazine. A question at this time may be—"Do you recommend this to your chum as an interesting story?" Another—"Did you get any vivid impression from your reading?" Finally Poe's idea of a "single, unique effect" is explained and found in our particular story. The next step is frank and unvarnished analysis. Plot details are discovered, their relevancy to the main effect brought out, thus illustrating the concentration essential to the short story. This leads to the order and interweaving of the facts. By this systematic study the elements of the plot become very distinct. The problem, the obstacles, the sequence can be detected in any narrative. Studying the preponderance of one character forms the point of departure for a discussion of the presentation of characters. The average student does not understand and therefore does not enjoy the subtle shadings in delineation of character or of situation. Kipling's average story is a sealed book to him. He does see, however, the new light thrown on the miners in "The Luck of Roaring Camp" by the arrival of the baby. The fact that Kittrell, in "The Gold Brick," could not do satisfactory work while going contrary to his better nature is self-evident. These are objective enough to be comprehended.

Also the bits of well described setting are judged by their ability to vivify the one impression. The work next centers on the smaller details, the choice of words, of comparisons, of figures of speech. It is not a vague appreciation of fine sounding phrases. Each is judged by its value in adding to the interest or in putting us immediately and responsively in the place of a story character.

This in a general way is the work done on a series of typical short stories: first, the main effect; second, the selection of details which make for unity of construction, of character, and of emotion, with attention to the skillful manipulation which distinguishes the master from the amateur.

Poe, Hawthorne, Stevenson, Barrie, and Bulwer-Lytton furnish us with material. This reading is supplemented by the work of those who show more of the modern American tendencies. Some of these are Myra Kelly, O. Henry, Wilkins-Freeman, Bret Harte and Zona Gale. These stories are used for book-reports, written in class, the pupil making individual and unassisted application of the points stated in the outline. The aim, of course, is to strengthen the wings of judgment by a little practical exercise and to link the school work with every day reading.

You are asking as to the results. We all realize the perfect method is still in hiding; that results vary not only with indiivduals but with whole classes. In urging my claims regarding the short story, I shall try to present only what is reasonably constant.

The first result has been referred to before. There is noticeable a positive change in attitude toward current literature. The student finds more in a story than the plot and usually there is a pleased recognition of the fact. In the end, higher standards will be developed, so that the tawdry in writing will not satisfy.

Next, the consciousness of tools at hand creates a desire to try them. Writing is attempted and last year resulted in the publishing of two stories. We hear a good deal about striving for self expressions and the benefits accruing from it. This seems to be a desirable result.

Usually a student is appalled when facing a theme assignment because he realizes his lack of equipment—no subject matter, no definite methods, no certainty—only an assignment. Does the short story help to remedy the condition? I believe it does. It has opened the eyes to the material in the immediate environment. A short story does not require a lofty theme nor a treatment assuming tragic proportions. Myra Kelly used school, teachers, pupils, parents; Zona Gale a village common and two ordinary people attending a circus; O. Henry, a newspaper office, a southern editor and a northern advertiser from Detroit. Let us consider these a bit. We find the characters ordinary everyday people, using ordinary language and meeting ordinary situations. We find these situations in our everyday life. All we need is the open eye. The setting may be the campus, or high school chapel, or railroad station—it makes little difference if one sees its characteristics and possibilities. This result has been achieved. A fine theme was written on the feelings experienced in a Physics class, when the work was unprepared. The English class proceeded to discuss the composition as to its use of suspense, the well selected details, the omissions of irrelevant facts, and the handling of dialogue. The discussion as well as the writing showed the acquirement of two kinds of equipment—the material, and definite methods. Given this equipment the average student imagination will supply the requisite invention for good theme writing.

And last of all, the pupil applies the knowledge gained, to his reading of other types of literature, as for instance the novel and drama.

So the detailed study of the short story creates a reaction on environment and literature and a strong desire for self expression.

PHYSICS AND CHEMISTRY CONFERENCE

CORRELATION OF CHEMISTRY AND DOMESTIC SCIENCE IN BOTH HIGH SCHOOL AND COLLEGE INSTRUCTION.

PROFESSOR AGNES HUNT, MICHIGAN AGRICULTURAL COLLEGE.

The subject of Chemistry, unlike Domestic Science, presents to your minds a definite concrete subject, saturated with laws, relationships, and formulas familiar to you all in a greater or less degree. Domestic Science, on the other hand, presents a confused, indefinite, conglomerate mass of material undeveloped, not classified in any such degree as the above. Its future development depends upon the systematizing of the various sciences and their application to Domestic Science.

The American Home Economics Association has defined the subject in this way: "Home Economics, as a distinctive subject of instruction, includes the economic, sanitary, and æsthetic aspects of food, shelter, and clothing, as connected with their selection, preparation, and use by the family, in the home or by groups of people."

A Committee reporting on College Courses in Home Economics advises that, "Instruction in this subject should be based on scientific principles and graded according to the maturity, attainments, and purposes of the student. Courses or instruction should be divided into general classes suited to the respective requirements of elementary and secondary schols, normal schools, colleges and universities." This committee further recommends that at least two years work in the secondary schools should be counted on credit for entrance to college.

Psychologists tell us that as a child develops his process of thinking changes from that of learning by rote or repetition of ideas to a correlated massing of connected ideas, often called logic. Science, to be thoroughly appreciated, demands the latter mental process. Just when an individual is able to digest the logical method of thinking, our psychologist can at present only theorize. Experience shows, however, that a student of high school age is most interested in the "how" and "how to do," in other words, manipulation. Not until he enters college or university does he thoroughly appreciate the "why," or the application of science to the process he or she already knows.

By this I do not mean to suggest that science in the high school is not beneficial or cannot be taught to apply to Domestic Science, but that its fullest appreciation is not reached until the person's mind is capable of logical thinking in the abstract, and this may not be attained until college is completed, possibly not then.

The Domestic Science subjects that have been handled with the greatest success in the high school are:

I. Cooking. (a) Showing how to combine foods, (b) what the finished product should look like, (c) the cost, and (d) how to serve foods.

II. Laundry work. In high school as well as in college, this subject belongs with the study of textiles and textile fibres. While the removal of stains, effects of soaps or fibers, or relation of water may be an application of chemistry, still the subject of textiles can not in the present stage of development be treated alone from its physical and botanical phases.

III. Sewing is an integral part of high school work, and should be treated from the same angle as cooking, *i. e.*, from the standpoint of the student's ability to know how to handle fabrics, fashioning them into garments.

The correlation of Chemistry to Domestic Science in the high school may be treated from these three arrangements:

I. Chemistry as a prerequisite to Domestic Science.

II. Chemistry taken during the same period of time that Domestic Science is taken.

III. Chemistry following Domestic Science.

In the first method with the present presentation of Chemistry in most of our high schools, the teacher is not interested (or shall we say not capable because he can not get the point of view), in arousing the average girl's interest because he makes the subject so foreign to her realm of experience. (We can not appreciate anything we have not experienced or imagined.) The subject then becomes, from the girl's point of view, a mass of memory lessons. No wonder she palls, squirms, fidgets and despises chemistry, with a bitterness that follows her through all her later life. The subject under this arrangement is a failure unless the teacher of chemistry is a wonder. How few of any of our teachers are that.

The second method, chemistry taken during the same period of time as is Domestic Science, adds interest to both subjects, especially if the teachers are willing to plan each course with respect to the other, in order to get the chemical principles applied to the Domestic Science. For example, when oxidation of gases is being studied in chemistry, no fitter or more apt application could be made than the regulation of the air mixer to the amount of heat generated from a gas burner or even a stove generating heat from the gases of wood or coal.

The last method, in which Chemistry follows Domestic Science, has been tried out in the School of Education, Chicago University, with the most marked success. The student's interest in learning "how" to do things has aroused an attitude which makes her jump at the opportunity to understand some of the problems she has failed to comprehend in her Domestic Science subject. The treatment of cooking can be taught so as to be of extreme benefit to the girl and yet not dependent on her previous knowledge of

science up to this time. The explanation of science terms can be given in a very simple way, if necessary.

In college or university, when the stress is changed from the "how" to the "why," the problem for the Domestic Science teacher is a very different one. Here Domestic Science, or Home Economics as we prefer to call this subject in institutions of higher learning, must be studied in terms of other sciences. There is no other way of understanding the changes in cooking or the effects on the body of food eaten. If the sciences are going to keep up with the trend of the times, they must study the problems of Home Economics which fall into each respective subject. Only the specialist is able to follow the intracacies necessary for research work. The teacher of Home Economics must by means of well planned laboratory and lecture work bring these results together, unify them and apply them to the lives of the individual in the family, in the home, or in the other groups of people. Home Economics problems, like those of Agriculture, are so complicated and involved that even the most expert of scientists only crimp the edges of the situation. These problems can not be divided up into exercises of physics, biology, physiology, and chemistry. They are the interweaving of all of these into a physical, physiological, biological chemistry,—if you will allow me to desecrate by such close proximity your sacred sciences in this fashion.

I am very glad to note the change of heart with which some of our scientists are viewing the subject of Home Economics in the colleges and universities. Without a doubt the subject of Home Economics is the most human of all subjects yet presented in the college curriculum, because it deals with human beings in the sum total of their activities. (Too large a field for a four-year course.)

The problem, then, of the various scientists, is to teach each subject with the idea of understanding the principles involved in that particular science, drawing the illustrations of principles from the realm of experiences of the student who is trying to learn the subject and not from the realm of experience of the teacher, or the teacher's teacher from whom he has obtained his information verbatim.

Not being a chemist, I do not feel competent to suggest methods of handling the subject of chemistry in a college to meet these requirements. That must be left for that department to work out its own solution. But when making chemistry a prerequisite to Domestic Science, the teacher must present the prerequisite as a live subject, not a mere series of formulae, laws, weights, and measures, to be memorized in order to pass a test. I feel no more stupid than the average girl, and yet I spent hours learning the laws of definite and multiple proportions and Avogadro law which were handed out to our class to learn when we started in to study Chemistry.

Our physicists have left untouched as yet the mechanics of the household. They draw their illustrations of electrical phenomenon from the dynamo, the magneto, etc., instead of the electric iron or oven, or sewing ma-

chine motor. Or the circulation of hot and cold water in the ocean currents instead of the hot water tank back of the range. Homely illustrations—yes—but within the realm of the girl's experience.

The changed attitude of sciences in regard to the application of their illustrations is well shown in some of the more recent publications of Kahlenberg and Hatr. Chemistry in relation to Daily Life; Buchanan Household Bacteriology; Sherman Food and Nutrition; Jordan's Principles of Human Nutrition.

It remains for a more complete and thorough study and the application of the sciences, both in the form of published material and the presentation of work to classes and to groups of people at large. An understanding and a discussion, such as a meeting of this kind brings, helps to clarify the outlook.

THE CARE OF APPARATUS.

MR. ALBERT FITCH, ALLEGAN.

We high school science teachers are apt to care for our apparatus after a rather haphazard manner. The laboratory rooms in some of our schools are disgraces to our profession. Let me illustrate: A short time since I was told of a case that exactly fits in here. The chemicals were kept in a closet without windows or artificial lights. When this new teacher went in to find out what he had on hand he saw that no system whatever had been used as to the placing of bottles. So that there were in some cases three or four duplicate bottles of chemicals for which he had little use, due of course to the fact that his predecessors had been careless in their care of apparatus. If a druggist used no more care than many of us his competitors would run him out of business in a year. In another city the new teacher found a pile of thermometer cases in his store room. He opened several and finding them empty he replaced them thinking all were empty. Later in the year he had occasion to clean out that corner of his store room. Imagine his surprise when he found four or five high grade thermometers in the bottom of the heap.

Wishing to know what some of the large supply houses had to say in regard to the care of their apparatus I wrote several for suggestions. What I have to say is what I have gleaned from their replies. The Central Scientific Co. said they would like to emphasize the necessity of buying good instruments at the start. Get the best apparatus obtainable for the experiment and the problem of care and repairs is reduced to a minimum.

But no science teacher is going to restock his laboratory. With a few exceptions he must use what the school has on hand and therefore he must be certain that what he has is in working condition. A Jolly Balance Stand-

ard is not good for much if all its springs are lost or tangled. Nor is a high class microscope of much use if the threads on the fine adjustment are stripped. Can we not each know before school opens next fall that our apparatus is all in working order? The suggestion has come to me that it is the *duty* of every science teacher to examine his apparatus carefully at the end of each school year. He should have a catalog of his equipment which will give him the name of each piece, its maker and approximate price. It is likewise his *duty* to look over his chemicals at that time and order what will be needed for the next year. And let me add if it is his duty to do these things when he is to return, it is tenfold more his duty if another is to fill his place the next school year.

But don't understand me to say that cataloging apparatus and overlooking it once each year is caring for apparatus. One must constantly be on his guard and see that after each use of a piece it is returned to its proper place clean and ready for use next time. Glassware can be cleaned much easier if one does it immediately while the glass is wet or at least before he forgets what the piece last held. Metal parts which come in contact with liquids should be carefully cleaned and dried or they will rust out in time no matter how they are made. It is always a good plan to keep metal parts well oiled.

A practical suggestion may be of use right here. The graduations on glassware is pretty sure to lose its distinctness after a length of time. The Cambridge Botanical Supply Co. recommend the use of paste made of plaster of Paris and India Ink. Mix it quite stiff and rub it on with the finger. The finger will fill all graduations and wipe off all excess of paste. If the paste have just the right consistency a very few minutes will suffice for its complete drying.

Bausch & Lomb issue little boklets on the use and care of apparatus made and sold by them and each booklet is full of useful information. I can give you but a very few of their suggestions. They say be careful always when dealing with delicate instruments. Be sure you are right and then go ahead but first be sure you are right, don't reverse the order. The microscope and microtome are delicate instruments and may easily be ruined by a little improper care. When sent from the factory they are adjusted and ready for use. One should never try to adjust either unless he has the booklet with him for the turning of a screw on the microtome may throw the instrument completely out of adjustment. But of course sometimes one must readjust even such delicate instruments. When so doing one ought never to use a common wedge shaped screw driver for if a screw refuses to turn he will ruin the head. Instead one should file his screw driver with its faces parallel and just far enough apart to fit the screw he wishes to turn. Such a screw driver holds better and cannot damage the screw head. This same company offers a caution which we have many of us been neglecting, I fear. They put it in italics: *Never use alcohol about a microscope.* It dissolves the lacquer on the frame work and so causes oxidation of the

metal and if used to clean the lenses it will dissolve the cement and loosen the lens. And lastly never oil the rack and pinion. It only serves to collect dust and clog the instrument.

I have saved the electrical apparatus until the last because it is most easily damaged and least understood. The Western Electrical Instrument Co. made a big effort to help me. They went so far as to send me the damaged portions of a burned out ammeter which I have with me. It was destroyed by a student who short circuited a large storage battery through it. The results speak for themselves. Such accidents are liable to happen in any school unless especial precautions are taken. I have here a fuse designed to overcome just such accidents and it is recommended that every ammeter in every school be so protected. The theory is simple enough. Each ammeter of standard make is designed to withstand a load much in excess of its rating without damage. If a proper fuse be in the circuit it will blow out before the current is reached which will produce permanent damage and no loss of accuracy results because of its use.

But most of our trouble does not come from the spectacular accidents but from the wear of daily use or neglect. Dust which is always plentiful may cause endless trouble. It collects in the plug sockets and changes the resistance of our boxes or the capacity of our condensers. It gathers on the static machine and unfits it for work. The dust cloth with a little kerosene oil is its only remedy.

You will agree that among the things we aim to teach are orderliness and logical reasoning. Certainly then no teacher can succeed as he ought who is neglecting these characteristics with respect to his tools, the apparatus.

MATHEMATICAL CONFERENCE

SOME CLASS ROOM SUGGESTIONS.

MISS KATHARINE G. HINES, DETROIT CENTRAL HIGH SCHOOL.

Class Room Suggestions is a heading under which one might say almost anything, but I have no intention of theorizing on the subject. Instead I shall merely try to tell a few of the things I've been doing in my own classes the past year, with some of the ideas I have tried to work out. My hope is that a few of these ideas may be new to some of you; but if not—if my suggestions are all old stories which you have worked out and put into use for yourselves—I will at least have the consolation of knowing you must think me sensible in my teaching, for I will be agreeing with you and your methods.

During the past year I have had classes in Plane and Solid Geometry and Twelfth Grade Algebra, but perhaps the most interesting of these, from a pedagogical point of view, is the Plane Geometry. The first few weeks of Geometry seemed to me the crucial period, for it is then that a pupil's natural curiosity toward a new subject becomes one of two things—a real interest and a desire to make further discoveries, or an intense dislike for something he does not in the least understand. Why prove what anyone can see so, is his query. The one thing to guard against right here is memorizing, for once the pupil begins in that way, 'tis well nigh impossible to break him of the habit; and the one thing to teach him is how to think logically.

To my mind memorizing a definition ranks next in heinousness to memorizing a demonstration. The pupil should be taught to *think* from the very first, and definitions should be thought out, not memorized; given in the pupils own words, not the words of the text, which are often as strange and unknown to him as the word he is trying to define. To the advocates of *memorized* definitions, I have one request to make. Ask your class to define a parallel line or an equal angle (without laying undue stress on the indefinite adjective, however) and see if some members of the class do not glibly recite the accepted definitions of parallel lines or equal angles, showing an utter lack of thought of the question asked, and without in the least realizing the absurdity of what they are saying.

A definition mathematicians could hardly accept, and yet one which was valuable in that it showed real thought on the part of the pupil, was a definition one of my boys in beginning Geometry gave a while ago, for rhombus. He said, "I couldn't quite understand what the book said about it, but what it really is, is a *square pulled out of shape*.". The book definition was an "equilateral rhomboid."

One of the definitions I find hardest to make clear to a beginner, is the definition of an angle, and its amount of divergence versus the length of its sides. To illustrate this I often take an angle cut out of paper, place it against the board, and by outline make an angle equal to it; then removing the paper angle, I prolong the sides of the angle on the board, and again make the two coincide. This usually convinces even the most skeptical that the length of the sides has nothing to do with the size of the angle.

The first theorem we give our beginners is—Two triangles are equal if two sides and the included angle of one equal two sides and the included angle of the other, each to each. I find the method of superposition often troublesome, for pupils do not at first realize the necessity of knowing the angle to get the direction of the line, before talking about its length. But here again kindergarten methods are a help. I tell them to imagine themselves walking around a triangular block, and they soon see that having traversed the length of one side of the block and come to the corner, they must know which direction to turn before going any further; that is, they

must know the size of the angle at that particular corner or they cannot get onto the adjacent side of the block.

As soon as the two equal triangle theorems—two sides and the included angle, and two angles and the included side—have been proved, I give numberless easy originals, showing the applications of these theorems, so the pupil will grasp the difference between proving a theorem and using it as an authority by which other facts may be proved. Let this difference once be thoroughly mastered, and the idea of what Geometry really is, begins to dawn upon him, and his interest in the subject will increase directly as his ability to solve these simple little applications. Originals form the real test in Geometry, for of course the power to think logically is the one important aim, and this power to think must be developed by the pupil himself. He learns to reason by figuring out the reasoning himself, not by learning other people's reaons, just as he learns to play football by getting out for practice each day, not by sitting on the side lines watching. Of course his first attempts at reasoning must be done under proper guidance, just as the football player needs a coach to show him the proper methods of the game, but the pupil must actually *do* the thing himself. *He* must be the one to take the initiative. Too much help in originals is a hinderance, rather than a help.

From the first, a pupil should learn to go to the board and point directly to, not toward, the lines and points of the figure as he refers to them in his demonstration. This of course makes a self-conscious pupil more self-conscious than ever, but it is one of the things he must get accustomed to, and the sooner, the better. A little device for home study which has helped many of my easily fussed beginners, who are scared to hear their own voices, is for them to draw the figure on paper and pin it up on the wall at home, then, taking a pointer in hand, stand up and give the whole demonstration out loud from start to finish. This gives them practice both in actually putting their ideas into words, and in using the pointer, and although sometimes a pupil scorns to use such a device, deeming it too foolish, the good results from it are soon noticeable in those who do try it.

All the figures we use in class are lettered differently from the ones in the text—to guard against memory work—and as often as practicable we draw them up side down or in some different position from the original figure—thus teaching the pupil to be independent of the text in every way. Another practice I have, which I think strengthens the pupils power of concentration and reasoning ability, is, as he gets further along in the work, to have the simpler theorems proved without any figure at all—that is, to keep the figure in his mind only. Of course, this is somewhat hard at first, but with a little practice it is soon accomplished, and it certainly assures undivided attention on the part of the class.

Usually, for the first few weeks at least, I draw the data lines of any figure in colored chalk, and always insist that the pupil write his data and

what he is to prove on the board, and I find his chances of mixing up the two things, and becoming rattled or fussed as a result, are greatly lessened by so doing. Also from the first I encourage his writing statements of equalities in the form of equations, using symbols instead of words, wherever symbols are applicable. As for instance, instead of saying the sum of angles 1 and 2 is two right angles, we say $\angle 1 + \angle 2 = 2 \llcorner^{s}$. Facts stated in equational form are more concise and to the point, and much more easily grasped by the average pupil as a result.

Board work in beginning Geometry is most essential, tho' like everything else, can easily be overdone. But one of the quickest and most convincing ways of showing a pupil his mistakes in a demonstration, is to have them down in black and white. Then there is no getting round what he really said. If left to their own devices, however, I find most pupils will write their demonstrations in composition style—minus the good grammar—running statements together in anything but a clear manner. I therefore insist upon their using a regular form for demonstrations—as follows—

Theo. If two lines intersect, the vertical angles are equal.

Data. Two intersecting lines, MN and PR, forming $\angle^{s}$ 1, 2, 3, and 4.

To prove: $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$.

Proof. 1) $\angle 1 + \angle 2 = 2 \llcorner^{s}$ (If one line meets another, the sum of the $\angle^{s}$ formed $= 2 \llcorner^{s}$).

2) $\angle 2 + \angle 3 = 2 \llcorner^{s}$ (Same reason.)

3) $\therefore \angle 1 + \angle 2 = \angle 2 + \angle 3$. (Things = same thing = each other.)

4) $\therefore \angle 1 = \angle 3$ (subtracting $\angle 2$).

5) In like manner, $\angle 2 = \angle 4$.

6) Theorem.

First, the general statement of what is to be proved, the theorem,—then the figure, the specific data, and what is to be proved, and then the proof, with its steps properly separated and numbered. And whereas the last step of the proof is of course a statement of the theorem which has just been proved, so should the next to the last step always be the exact specific statement made in the beginning, as to what particular thing was to be proved, as in this case, that $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$. Whenever I can get the pupils to look at a demonstration as an argument in which they are on the affirmative and I the negative, and can make them see that any false statement, or one without authority, on their part destroys the whole force of their argument, I feel the battle is half won.

Of course in the beginning we cannot insist upon too rigorous proofs, as that would lead our pupils to memorize, and thus frustrate our whole aim, but we can and ought to insist upon accuracy of expression, good grammar, and concise statements. For obtaining the good grammar, I used a foolish little device last semester, which nevertheless worked like a charm. Each pupil was allowed one grammatical error before penalty was exacted, but upon the second slip, sentence was meted out proportionate to the mistake.

For instance, one girl who insisted upon saying, The sum of the angles *are* thus and so, had to greet me each morning for a week with the phrase, The sum *is*, instead of her customary Good morning, and so on down the list. To be sure, it sometimes taxed my ingenuity to evolve appropriate penalties, but it was well worth while in spite of its foolishness, for it accomplished the two-fold object, of injecting a little fun into the class, and at the same time making them alert for grammatical errors.

Once or twice a term, as time permits, I line the pupils up and have an old-fashioned spelling bee of words they have been constantly using in the geometry, or we have a spell-down of definitions or statement of theorems, for I consider accuracy in spelling or in stating definitions and theorems, fully as important as accuracy in mathematical calculations.

Solid Geometry necessarily has to be treated in a somewhat different manner, in that it is not so much a subject of discovery and a discipline for the mind as the Plane. Purely demonstrative exercises,—that is, exercises such as the pupil can do, are hard to find in Solid Geometry, but numerical exercises and practical applications of the theory abound, and the pupil can be given much good algebraic work for practice in the various uses of the formulae. Certain of these formulae are of course fundamental, and *must be learned,* but many others can be so easily derived from these fundamental ones, it seems to me a waste of time and energy for the pupil to attempt to memorize them. He might much better be absolutely sure of the ones he does know, and use his brains for obtaining the others from knowledge already at his command. Also many of the theorems (difficult ones that are not needed) can well be cut out, thus allowing more time for practical mensuration and the theorems leading directly or indirectly to it.

A great difficulty in teaching Solid Geometry comes from the inability of some pupils to understand the diagrams of the solids—in other words, to "see the figures,"—but this inability on their part can be overcome in two ways. First and foremost, by constant use of models, and by this I do not mean requiring the pupils to make accurate models, for whereas that ofttimes would clear away some misunderstandings on their part, the total good resulting is not at all proportionate to the length of time spent in making the models. Some cardboards and long pins or pieces of wire to represent the different planes and lines, or even pencils and pieces of paper, will settle any difficulty which may arise the first few weeks. The ingenious teacher can make almost any model she wishes for the work in points and lines in space, out of the materials ordinarily on her desk, and at a moment's notice. To give a good working knowledge of prisms and pyramids, cylinders and cones, a regular set of models is almost indispensible, but even those can be made in class if necessary, from some easily obtained, readily cut commodity such as potatoes. It matters not what the substance, so long as the pupil has a model of some sort to help give him a clear understanding of the figures, and much can be learned from an ordinary potato in the hands of a skillful teacher.

Another means of cleaning up the pupil's vision of a figure is the use in class of text-books which give photographs of the models as well as the diagrams. This latter means is also a great help to the pupil in drawing figures for himself. He sees more clearly which edges of his planes to make heavy to give his diagram the right perspective. And if some still have trouble in distinguishing one plane from another in the drawings, I often use colored crayons to represent the different planes.

Another reason many pupils find Solid Geometry hard is because they have no clear conceptions of their Solid Geometry definitions. They are not sure just how much is in the definition of a prism, for instance, nor just what constitutes a regular pyramid, and when asked to give an illustration of two symmetrical solids, are often at a complete loss for an answer, when their two hands, right in front of them, form one of the best illustrations possible. Pupils are altogether too dependent on text-books to make good use of their own brains and ingenuity.

In Spherical Geometry I am indebted to Mr. Frost, of Detroit Central, for one of the most satisfactory devices I use—namely, embroidery hoops. Two large hoops at right angles to each other, form an admirable sphere, while the sections formed by planes passed through the sphere, in all their varying positions, are easily represented by the smaller hoops placed inside, and a combination of string and hoops will serve to clarify many a confused idea about axes and poles. To illustrate lines and planes inside a sphere, I know of nothing better, and the models have the added advantage of taking practically no time to make. But of course these models do not take the place of a spherical blackboard, which I consider an absolute necessity throughout the course. Moreover, the puipls should *use* the spherical blackboard until they are perfectly familiar with all the figures under discussion.

The question of how to get Solid Geometry figures on the board without taking up too much of the class time, is a question I have never yet heard satisfactorily answered. This semester I have taken to drawing many of the figures myself, before class, sending the pupils to the board to put on the figures only occasionally, but whereas that gives more time for demonstrations and originals, many pupils need just that practice in drawing, so it seems to be a case of "Rob Peter to pay Paul" whichever way you work it. A device some teachers have used is to have the pupils bring in the figures drawn upon large sheets of paper, these papers to be pinned up in the room for class use.

But after all, each teacher has to study her class and devise means suited to that particular group of boys or girls, for no two classes thrive under exactly the same methods. The main object is to interest the pupils in the subject taught, devise ways of keeping them alert and on their toes, and guide them in the manner of their studying so they can attain the best possible results, encouraging them above all things to have confidence in their own ability. And the teacher who can accomplish this, needs no suggestions from anyone.

BIOLOGICAL CONFERENCE

INSTRUCTION REGARDING THE SEX LIFE.

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A widespread awakening among the educators and social workers on the importance of sane and safe instruction on matters of sex for children and adolescent youths has come within the last ten years.

The more educators and social workers study the problem of instruction in social ethics, the more we are convinced that no final, adequate and acceptable solution of the social problem will ever be reached until most children, if not all, are receiving wholesome instruction from their parents in the home.

That the time will ever come when all children will be receiving such instruction in the home can hardly be hoped for. There is coming to be a conviction very general among educators that there will always need to be some supplementary teaching regarding life problems in the schools, partly because some of the children are sure to have little or no instruction in the home, and partly because the obligation of the schools to develop the character as well as the intellect of their pupils, will make it necessary for the schools always to supplement the home education in all ethical and moral lines as a part of their obligation toward character building. When we remember that the school is only an extension of the home, and that the work now done in school was originally done in the home, and that the division of work between home and school is really one of expediency governed by the best ultimate good of the child, we are forced to the conclusion that there is really no good reason why this teaching should not be done at least in part in the schools.

A corollary to the foregoing proposition is this: The teacher is vicarious parent to the pupil. Every woman teacher is vicarious mother to the boys and girls in her school. Every man teacher is vicarious father to the boys and girls in his school. This vicarious motherhood and vicarious fatherhood carry with them the responsibilities of parenthood that can no more be evaded or shifted to other shoulders than can the responsibilities of physical parenthood.

The attitude of teacher to the child should be the attitude of parent to child, namely, it should be characterized by earnestness, seriousness, sympathy, and love.

The reticence with which all these life subjects have been treated in the past makes it necessary for both parents and teachers to be prepared for this teaching. Not only should both parents and teachers be given a more whole-

some viewpoint as their knowledge broadens and deepens, but the methods of presenting this knowledge in such a way that it may come easily within the comprehension of the child at its various ages of development is equally important.

We have found after long study of this teaching that the instruction should begin with little children in the home, and furthermore, that it is wise that the instruction come to the child in answer to its spontaneous questions.

It is the object of this brief presentation, first, to present the principal facts of life and the sex life in such a simple, systematic and untechnical way that any mother or teacher without technical knowledge will clearly understand; and second, to show the parents and the teacher how these life truths may best be presented.

It helps the teacher better to understand his children if he knows one of the great laws of development that psychologists have taught us. This is the law, simply and briefly stated: EVERY HUMAN BEING IN HIS DEVELOPMENT FROM INFANCY TO ADULT LIFE REPEATS THE HISTORY OF HIS RACE.

We find that our race emerged from a condition known as Primeval Man into a condition somewhat advanced above that, known as Savagery. Our race was in this condition of Savagery from about six or seven thousand years ago to four thousand years ago. Savages are fetish-worshiping, raft-sailing, cave-dwelling children of Nature.

From about four thousand years ago to about one thousand five hundred years ago our ancestors lived in the forests of central and southeastern Europe, and were in the age of Barbarism. This age is characterized as crude and cruel, rough and ready, venal and vulgar, blundering and blustering Barbarism. In their age of Barbarism they lived in tents if they were nomadic, in rude dwellings of stone or log if not nomadic. They were developing the industries concerned in the making of implements of war and the chase, of fabrics of apparel, and of various conveniences about the home. It was the age of war and the chase. It was an age of hero worship. Woman was a chattel; affection and consideration for woman was not known.

From this age of Barbarism our race emerged into Chivalry about fifteen hundred years ago. The age of Charity was at its height about five hundred years ago and emerged by imperceptible gradiation into our present system. In the age of Chivalry society as we now know it came into being. The shackles were stricken from woman, and she came into her present high estate.

As the father watches his boy develop, he sees in his six- to ten-year-old boy a repetition of the savage of the race. With his pockets filled with fetishes (material objects valued far beyond any intrinsic worth) he digs caves and sails rafts—a child of Nature loving the woods and the water.

Between the ages of ten and fifteen the boy possesses the qualities essential to the barbarism of the race. He is barbarically crude, barbarically

rude, barbarically vulgar, barbarically blundering and blustering. He glories in war and the chase. He is a hero worshiper. He has no use for girls, and is even restive under the mild restraints of his mother.

At fifteen all this is changed. The boy begins to "slick up." He wishes to impress the girls. His rudeness to the girls now disappears, and he becomes a society young gentleman.

The pre-adolescent boy, the hero worshiper, the barbarian, may well be governed with physical force if that seems necessary, but the adolescent boy in his age of chivalry when "knighthood is in flower" should never be humiliated in the presence of his peers. He should be treated as a gentleman, and you will uniformly find him such.

Inasmuch as the difficulties to which we have referred begin in childhood and youth through innocence and ignorance, it must be evident that the education must begin in youth. Those who have given this problem extended study and thought all agree that education in social ethics is a home problem. Parents must teach their children the great truths of life. Coming from parent to child this teaching will be certain to have its two great essentials, namely, sincerity and sympathy. However, we find that a very small proportion of the present generation of parents possess either the requisite information or the necessary inclination to give this instruction.

There must be a transitional period, during which educators, social workers and all the constructive forces of society work together to produce a generation of parents who will possess both the information and the inclination. That means that we must go into the schools and teach the great truths of life to the children and youth. In this great work for society, let us never lose sight of the fact that we are doing this work in our relation of vicarious parenthood. We must school ourselves to feel toward these young people as a parent feels toward his child. The instruction must be given in all seriousness, candor and simplicity. It must be put on the plane of the ideal. There should be an attitude of sympathy toward the pupil. Those who have not had experience in this teaching can hardly conceive how beautifully the young people respond in their intense attention, and in the seriousness with which they receive the instruction.

The education of the youth in this transitional period should begin in colleges and universities. It may be said in passing that a considerable number of our institutions of higher learning have already made a good start in this teaching. We may look forward with assurance to a time in the near future when all these institutions will recognize their obligation in this direction and will have this instruction given systematically.

Instruction in social ethics and sexual hygiene must also be introduced into the high schools. Most high school pupils are in the earlier period of adolescence. The need for instruction is at no period of life greater than at the threshold of adolescence. The response of the pupil is at no period of life more ready or wholesome. It is, therefore, a matter of the greatest

importance that instruction in social ethics and sexual hygiene be introduced into all the high schools of the land at the earliest possible day.

Pupils in the grammar schools need certain facts brought to their attention, and this need is hardly less imperative than is the need in the high school. The girls of the seventh and eighth grade are as a rule coming into adolescence. Probably a large majority of eighth grade girls in general are in their first or second year of puberty. Their mind is filled with questions about life and they instinctively show a sort of hypersensitiveness on sex matters. Their mothers as a rule have not instructed them. The schools must do it.

The problem of the grammar school boy, while less a sex problem than one of inherent barbaric vulgarity, is still one that requires great tact, patience and skill on the part of the teachers. The seventh and eighth grade boy is still in his preadolescent period, still in his period of barbarism. He has not felt the primordial urge in his red blood, but he does show the barbaric tendency to crudeness, rudeness and vulgarity. While we are not going to become discouraged about him, we are going to extend to him from our elevated position of twentieth century chivalry a sympathetic helping hand that will guide him quickly through his storm and stress period and help him early to step up out of barbarism into his period of dawning chivalry.

This teaching in the grammar school requires incomparably greater tact and pedagogic skill than the teaching in colleges. It must be done by trained teachers; professional people either physicians or social workers called in from the outside cannot do this work for the simple reason that the number of physicians and social workers who possess the pedagogic skill and knowledge of, and sympathy with, child life is wholly inadequate to meet the requirement even if they were to devote their whole time and energy to it. Besides that the psychic effect on the pupils of calling in somebody from the outside is unwholesome and studiously to be avoided. It enshrouds the whole matter in a haze of mysticism and excites the curiosity and a tendency to talk among themselves with great danger of unwholesome results. This teaching of the great truths of life concerning reproduction and sex must be done by the teachers of the grammar school, but the teachers of the grammar school are not prepared either in their own mental attitude, the information they possess, or in their pedagogic training. The whole field of sex is to a vast majority of teachers a *terra incognita*. For a period of four or five years before we require sex instruction in the grammar schools the subject of social ethics, social hygiene and sexual hygiene should be taught in the normal schools.

The normal school course in social ethics should accomplish three very clearly defined objects: First, to give the pupil teacher a wholesome viewpoint concerning Social Ethics in all its bearings, displacing false modesty with real modesty and leading the student from the dimly lighted valley of prudish ignorance to the high sun-bathed mountain tops of idealistic virtue.

Such a change of mental attitude is wholly and solely a matter of education and is the first thing to accomplish for the pupil teacher. Second, to give the pupil teacher adequate information concerning the biology of reproduction ,the physiology and hygiene of the sex apparatus and sex life, also the sociological and ethicals principles involved in sex hygiene and social ethics. Third, to train the pupil teacher in the principles of pedagogy of this particular subject. It may be stated in passing that the teaching of no subject requires greater pedagogic skill and tact than this one. In the presentation of no subject does the teacher require a greater knowledge and insight into the psychology of youth than is required in the teaching of sex hygiene.

After all of the normal schools of a State have had a course in sex hygiene and social ethics presented to every student in the school for a period of four or five years it may be wise and the time may be ripe for requiring this teaching in the grammar school, because by that time there will be many hundreds of teachers in the State who will have been trained for this teaching and the probabilities are strong that almost every village and city school will have on its corps of teachers from one to a half dozen who will have had the benefit of this instruction in the normal school and who will be prepared to give this instruction in an acceptable manner.

Answering the question, when and how shall this instruction be given in the ideal case, let us repeat what was stated above that this is a home problem. Fortunately, Nature points the way with a great shining index. Nature has implanted in the heart of every child the instinct of asking questions. The mother and teacher have only to answer these questions when they are asked, answering briefly and simply and always in a spirit of sympathy and love, to rest assured that they are following not only the plan of Nature but also the plan of the God of Nature.

The first question asked by the child is almost certain to concern his origin. The little five-year-old girl creeps into mamma's lap at eventide and nestles her head on mamma's breast and asks, "Mamma, where did you get me?" Then she waits for mamma's answer. No real mother, under such circumstances, could bring herself to the point of telling the stork story to her child. Such a response to such a question would be unworthy the twentieth century mother. You may be interested to know what one twentieth century mother told her child in response to a similar question. Her little six-year-old boy was brought to his mamma's bedside and introduced to his two-day-old baby sister for whom he had watched and prayed for several months. He was very happy, God had answered his prayer; presently he asked: "Mamma where did the baby come from?" This was the mother's answer: "Baby sister came out of mamma's body. She was formed within mamma's body, she was formed from materials drawn out of mamma's blood, and that is the reason why mamma's cheek is so pale and mamma's hand so thin and white." The little boy's eyes opened wide with wonder. This story was to him incomparably more wonderful than the stork story would have been. He looked thoughtfully from mamma's pale face to the

little baby sister, back and forth several times. Then he asked this question: "Mamma, was I formed within your body too?" The mother answered: "Yes, my boy, you were. You were formed within mamma's body, you were formed out of mamma's blood, and that is the reason why mamma loves her boy so, because she gave her own life's blood for him." The little boy's eyes now took on a far-away look and he seemed to be trying to grasp the great thought of mother sacrifice. He evidently did catch at least a glimmer of the great truth, because after a few moments his eyes welled full of tears and turning to his mamma he threw his arms about her neck and said: "Oh mamma, mamma, I never loved you so much before," and the little boy meant it too, because from that day forth for many weeks he seemed to think of little else during his waking hours than what he could do to help the mother who had been so ready to sacrifice for him. This happened eleven years ago. The boy of six has grown into the young man of seventeen, stalwart, broad-shouldered, deep-chested, hard-muscled ,clear of eye, clean of life, and chivalrous. He must be the pride of his father's heart and the joy of his mother's heart. He is a neighbor of mine, and I have watched his development with great satisfaction. His attitude towards all womankind seems to be inspired by instincts of chivalry and honor. That this attitude has been developed by the teaching which his mother has given him from boyhood up, supplemented perhaps by some instruction and example on the part of his father, no one can doubt. Can there be any question that when the time shall come that all boys and young men will have been led into chivalrous young manhood in a similar way and when all girls and young women will have received from their parents a training which will give them a reciprocal attitude towards mankind, then the social problem will have been solved. Its solution is a matter of education, pure and simple, and this education must begin in early childhood.

The next question which the child asks as a rule concerns the physical differences between the sexes. Your little six- or seven-year-old girl may come with this question: as to how the mother knows whether her newborn baby is a boy or a girl. This is a fair question and must be answered, otherwise a suspicion of mystery is at once aroused and a gnawing curiosity is developed. The wise mothers in all generations have adopted a very simple method of forestalling this question and presenting in the family conditions which answer the question in the most natural and simple way. I refer to the custom adopted by the wise mothers in all generations of having the little children of the family meet in the nursery at bedtime at least one evening in the week in what some mothers call an "undress parade." Other mothers call it a "bath night frolic." The little boys and girls of the family ranging in age between two and seven or eight years, enter into these frolics with the keenest and most unalloyed pleasure. Never so free of movement, never so happy, and it may be said in passing, never more modest, than when freed from the hampering habiliments with which civilization has clothed us. As recently as four thousand years ago our ancestors were practically

nude savages living in the forests of Southeastern Europe and Western Asia. They were children of Nature and like these babies of our twentieth century Aryans so far from being immodest in their nudeness possess what the sociologist recognizes as absolute modesty, that is, modesty so perfect that in the nude they are unconscious of their nakedness.

Incidentally, little six-year-old Margaret is almost certain to note a difference between herself and little Mary, on the one hand, and Jimmie on the other, and will remark in her childlike innocence to her mamma: "Little Jimmie isn't made the same as Mary and I, is he mamma?" And the mamma will answer in a perfectly matter-of-fact tone: "No, little Jimmie is made like all boys and men, while you and Mary are made like all girls and women." This answers the question for all time so far as Margaret is concerned. In their turn each of the other children will ask similar questions or make similar remarks to be answered in the same matter-of-fact way, and to grow up without morbid curiosity regarding structural differences between the sexes. If some of you are worrying about Margaret's modesty let the writer assure you from the uniform experience of hundreds of mothers with whom he has conferred that when Margaret reaches the age when impulses and instincts of modesty usually appear in a girl, they will dawn in the soul of Margaret as naturally as the rose in the garden blooms in June. If a girl grows up in the atmosphere of modesty and consideration, the atmosphere being determined by the mental attitude and the habits of the older people of the family, rest assured that when the child approaches puberty the instincts and feelings of modesty come into their experience as a natural and inherent heritage of our race.

When the children approach puberty, there should be a parting of the ways for the girls and the boys of the family, the girls coming into closer comradeship with the mother, while the boys are led and inspired by the father. It is the inherent right of every girl to be led into beautiful exultant womanhood by a loving mother, and it is equally the inherent right of the boy to be led into clean, aggressive, triumphant manhood by a fond father.

As the mother sees her daughter growing rapidly in stature at the age of twelve to fourteen, and recognizes that this sudden growth in stature heralds the approach of womanhood, the mother seeks an opportunity to instruct her daughter in the ideals of womanhood, giving her the facts that she needs to know to guide her through the many problems, personal and social, that confront the adolescent. There are three important lessons that the wise mother teaches her daugher.

The first lesson for the girl to learn is the "Secret of womanhood." The mother may picture the typical twelve-year-old girl in all her lean and lank, awkward, and gawky, clumsiness, self-conscious, ungainly and unprepossessing in the highest degree. This preadolescent girl is in her "ugly duckling" stage of development. Now let the mother picture what the girl is to be in four or five short years. Graceful in figure, graceful in every movement of her body, possessed of poise and repose, her rosy cheeks glow-

ing with the red blood of good health, her lustrous eyes luminous with the light of radiant young womanhood. Then the mother reveals to the daughter the secret of this remarkable change and tells her how when the little girl is about thirteen years of age her ovaries begin to prepare a wonderful substance, that is absorbed into the blood and through the blood distributed all over the body where tissues are growing and changing, and that this wonderful substance—the magical stimulus—formed in the body for that purpose causes this remarkable transformation in the little girl's body and no less remarkable a change in her soul, possessed first of purity, that matchless quality that runs like a golden thread through the whole fabric of her life; second, of altruism or unselfishness, the second great quality of the soul of woman, also of other hardly less beautiful qualities that make her soul so beautiful that when once it is really seen one is after that hardly conscious of her body however perfect that may be.

The mother explains to her daughter that this great change that is the first step of developing womanhood is due to a substance formed in her ovaries—formed in her sex apparatus. When the girl knows this great truth, she naturally from that day forth looks upon her sex apparatus as sacred to her womanhood and a few words of counsel from the mother will guard the daughter against permitting or indulging anything that will irritate or excite this part of her body, being assured that such irritation and excitation will disturb the great work which in the plan of the Creator her sex apparatus must do for her womanhood.

The second lesson which a mother teaches her daughter is a simple, clear explanation of the monthly period which is soon to be a part of her daughter's experience. She forestalls fears and forebodings by explaining to the daughter that this experience which may be difficult at first to adjust herself to, is in the plan of the Creator her preparation for future motherhood. As this healthy-minded, perfectly normal, twentieth century girl is looking forward to future motherhood, as a natural and much-to-be-desired experience, her mother's explanation is accepted in the right spirit and the girl looks forward with confidence and serenity toward her approaching estate of womanhood. When it comes, all its experiences are accepted as a matter of course and in a spirit of assurance.

The third lesson which the mother teaches her daughter concerns her relation to her young gentlemen friends. Even though a girl may not formally enter society until she graduates from high school, she is in reality in society as soon as she enters high school. Adolescent high school young people are experiencing the social impulse and yielding to the social instinct. The relations of young people in the high school are in all seriousness social relations and should be so viewed by all who have any relationship to secondary education. So the girl's mother prepares her early for this new relationship by explaining to her the ideal social relations between young women and young men of her circle. The information that the mother has given her daughter in the first two lessons makes it very evident to this budding

woman that her person being sacred to her womanhood she should not permit any familiarities on the part of her young men friends.

Parents and teachers, perhaps through the organized agency of a Parent-Teachers Association, will cordially co-operate in the bringing about of ideal social conditions in the high school. All gatherings, whether formal or informal, of high school young people will be chaperoned. This chaperonage should be as wise and tactful as it is constant.

It is the inherent right of every boy, particularly between the ages of ten and fifteen, to have the guidance and the inspiration of his father. During this stage of a boy's development, the preadolescent stage, the boy is living over again in his psychic and social development that period of his race when his ancestors were in a barbaric stage of civilization. So the boy of ten to fourteen is in a way a barbarian. He may be cruel and vulgar, he is sure to be blundering and blustering, especially if he is a really, healthy normal boy. His mother and his woman teacher are taxed to the limit of patience with this young barbarian. It is the time of his life when he needs the firm, kind hand, perhaps the strong arm of a man, to guide, inspire and control him. Boys of this age should have the benefit, not only of a father's influence, but also of the influence of a man teacher, perhaps in addition to this the help of boy leaders in Y. M. C. A. or boy scout work. The boy is in his age of hero worship. The robust, the sturdy, the daring, the belligerent experience and exploits of men appeal to him. He quickly scans the pages of history and picks out as his heroes DAVID the Bear Killer, the Lion Killer, the Giant Killer, the leader of his nation's armies; ALEXANDER THE GREAT (Military Master of the World); CAESAR, Leader of the Legions of Rome; NAPOLEON, dauntless dictator of the destinies of Europe; WASHINGTON, and others of our National heroes. All of these heroes were fighters. War and the chase are in his blood. Those qualities of his father that appeal to him and lead him to put his father's name on his list of heroes, are not the qualities that appealed and still appeal to his mother to inspire her love and confidence, but they are the qualities of barbaric heroism. Those qualities of physical agility and endurance which helped his father to win athletic victories and break athletic records. They are the qualities that were developed and fostered in war and the chase. So the wise father, the twentieth century father, becomes a chum of his boy not later than his tenth year. He cultivates a real live interest in his boy's activities and aspirations. He attends the track meet between his boy's school and the neighboring schools, acting as referee, umpire or judge on the occasion. He takes half holidays during the summer vacations to join the boys in their ball game in a vacant cow pasture. He goes on short camping trips with his boy and on many a long tramp. In these ways he and his boy become chums, comrades in war and the chase. It makes the boy more mature and thoughtul, more self-reliant and confident, while it rejuvenates and rests the father. Once the boy's confidence and love are inspired, the father sets about systematically to

give him three great lessons in life, beginning his instructions where the mother left off.

The first lesson which the father teaches his son is the lesson of manhood and the secret of virility. He describes what it means for a boy to grow into a man and how after a brief period of lank, awkward, self-conscious clumsiness the boy develops masses of muscles on shoulders and chest, upper arms, forearms, back, hips, thighs, legs. When these muscles come under the control of his will as they should in his early teens he will have received from mother Nature the three B's of young manhood, namely Bone, Brawn, Brain, so that at eighteen years of age the young man should be able to stand out before the world broad-shouldered, deep-chested, erect, supple, hard-muscled. fiery-eyed and resourceful, full of initiative and will power, ready to get into the world's work. Then the father tells him the secret of manhood and explains about the internal secretion that is prepared in the boy's testicles from his fifteenth year on and that this internal secretion absorbed in the blood and distributed throughout the body causes the development in the youth of all these qualities distinctive of virile manhood, deprived of these sex glands the boy would develop first, into a sissy and finally at twenty-five he would be a slope-shouldered, narrow-chested, flabby-muscled, beardless, squeaky-voiced mollycoddle, absolutely lacking in every instinct and attribute of manhood. When the boy hears this from his father he readily understands that his sex apparatus is sacred to his manhood and that he should never do anything to irritate or excite it for fear of disturbing Nature's plan for his development of all these matchless qualities of manhood.

The second lesson which the father teaches his son is a simple, clear explanation of the nocturnal emissions or so-called "wet dreams." The father explains that every two to four weeks a liquid will flow from the boy's sex apparatus. This usually happens when the boy is sound asleep. He suddenly awakens to find that what has happened is a very simple little physiological phenomena that is perfectly natural and simply means a relieving of local tension. All the boy needs to do about it is to forget it and pay no attention to it. However, it is very important that the boy understands about this experience, which will be periodical and may last for many years ,otherwise he is likely to worry about it, assuming that he is subject to a sexual weakness. Not only do young men frequently misunderstand this matter, but it is frequently misunderstood and misinterpreted by others. It is just as important for the young man's mother to understand this phenomenon in the sex life of her son as it is for the father to understand about the monthly period of his daughter.

The third lesson which the father teaches his son concerns the social relationships with his girl friends. Helped by a little wise guidance and instruction from his parents the boy readily adapts himself to the impulses of chivalry which are stirring in his breast. While these impulses are of inestimable value in developing the highest social qualities they need guidance.

It is the unguided and unschooled social instinct that leads the young man to make an advance toward familiarity in his relation with his girl friends. The impulse to protection when unguided would prompt him to put his arm about his girl friend. The same impulse under guidance inspires in him the attitude and the daring of the chivalrous twentieth century knight doing homage to a lady of the court,—ready to endanger his life to protect her and ready to fight to the death in defense of her name and honor.

Where parents and teachers co-operate to teach the youth these great lessons of life we insure the conservation, in the child of the race, of those qualities that make for the fullest manhood and womanhood. Physical health is preserved and physical stamina developed. Psychical poise is maintained and the highest ambitions inspired. The youth of the race is conserved through this early and tactful teaching of the great laws of life.

COMMERCIAL CONFERENCE

ECONOMICS OF FEMINISM.

PROFESSOR H. J. DAVENPORT, UNIVERSITY OF MISSOURI.

(An Extract.)

Professor Herbert J. Davenport, bearing strikingly advanced ideas as to women, spoke to the schoolmasters, in session here yesterday, on the "Economics of Feminism."

Professor Davenport is head of the department of political economy at the University of Missouri. While he deplored the fact that the American women today bear but few babies, he advanced the opinion that women's mission on earth is no longer exclusively to bring large families into the world. "As it is not an entire career for a man to be a father," said he, "so there should be other functions in life for a woman than just to be a mother."

"There are doubtless women enough to resent and deplore the present situation, to chafe at institutional limitations, to long for a life of serious service-women who would prefer to be sought in marriage as human beings, rather than as heiresses, and to accept as husbands, not a purse but a man. Of their protests and their aspirations, the entire feminist movement is obscurely a recognition and an expression. The suffrage movement is merely a minor part in a larger program, though perhaps the most articulate of its formulations. Women are calling shrilly for the chance to function; for equality of opportunity in the serious business of life; for a share in everything that is worth doing; for economic independence by right of

economic worth; for the recognition of the obvious fact that, as it is not an entire career for a man to be a father, so there should be other functions in life for a woman than merely to be a mother.

"Doubtless these discredited and insurrectionary women may be all wrong in this, together with those of us men who are enlisted in their cause. Motherhood is, by racial necessity, woman's primary function, but only in the sense that fatherhood is man's primary function. But remember, that as the home really is, wifehood and motherhood cannot be woman's sole career. It is in the name of motherhood that we feminists make our protest against the actual home. Tried by this test of motherhood and of children, the typical home of the American ideal, the home of leisure and of economic futility, stands condemned. The children are not there. By lack of health or time or disposition, the parasitic women are sterile. The less a woman has to do of the actual work of her home, the fewer children she bears.

"The woman's life is given over to the supervision of an elegant home, and of servants. The man's life to making money. Here is where we touch the heart of the mystery, the secret of the woe which industry has brought—disasters rendered many fold more serious by the glaring inequalities in the distribution of wealth. It is to women, helpless and hapless victim of the competition of display, that the function of spending has been delegated. Institutionally and ultimately the wife is a mere agent in the process. The competition continues to center itself not upon adequate living but upon the exterior aspects of living.

"Modern industrial progress has brought prodigal wealth side by side with dire poverty, stress of life and overwork for practically all men, luxury, futility, and parasitism for most married women, industrial servitude, hardships and hopelessness for the others,—an extraordinary and tragic alembic of social forces by which to translate blessings into curses,—the home a disappearing institution,—with what is left of it dubiously worth keeping, vitiated by the pecuniary display of vicarious leisure and vicarious waste."

DRAWING CONFERENCE

THE DESIRABILITY OF IMPROVING THE TEACHING OF DRAWING THROUGHOUT THE STATE.

CHARLOTTE WAIT CALKINS, GRAND RAPIDS.

After wide discussion, Miss Calkins offered a preamble and resolution which being considered at length, were finally adopted as follows, the Secretary being instructed to communicate them to the President of the University:—The Drawing Section of the Schoolmasters' Club has for several years been trying to effect an improvement in the teaching of drawing in this state. To this end it has been holding annual conferences and exhibits of drawings made in the public schools. The effectiveness of this branch of instruction is controlled by many factors, important among which is the University. The work in drawing of the state is not now inspected by the University and thus standardized as is done in the case of other subjects Be it therefore

Resolved, That we, the members of the Drawing Conference of the Sshoolmasters' Club respectfully request the Board of Regents of the University of Michigan to arrange for the inspection of the teaching of drawing in accredited schools.

On the conclusion of the program and in accordance with the suggestions of Superintendent Cody, a motion was made, seconded, and carried to appoint a committee to arrange and present a standard for uniformity in art teaching throughout the state. The Chairman appointed as such committee:

Miss Alice V. Guysi, Art Director, Detroit.
Miss Bertha Goodison, State Normal College, Ypsilanti.
Miss Emelia Goldsworthy, Western State Normal, Kalamazoo.
Miss Spalding, Northern State Normal, Marquette.
Miss Elizabeth Wightman, Central State Normal, Mt. Pleasant.
Mr. H. M. Kurtzworth, Hackley Manual Training School, Muskegon.
Miss Charlotte Calkins, Art Supervisor, Grand Rapids.
Professor Emil Lorch, University of Michigan.

SCHEDULES AND CREDITS FOR FREEHAND DRAWING.

MISS CAROL M. LEWERENZ, DETROIT CENTRAL HIGH SCHOOL.

After years of struggle, of being classed as a "fad," drawing in the public school course is at last being accepted seriously. That this is so within our own gates is proved by the recognition given by our state university to the course in drawing taught through the grammar and the high schools. What is the nature of this course? For what does it prepare the student?

Fundamentally, the high school endeavours to strengthen what has been well started in the grammar grades, viz.: to encourage and train a discriminating appreciation of the appropriate and beautiful in all things, and to develop the ability for individual expression in ways that will satisfy an intelligent demand for beauty. The methods by which this result is worked for are well known to all here,—the studies in light and shade, in color combinations, in space relation, in applied design, in the history of art;—these are universal throughout the country.

But similar as are the courses in drawing, the importance given to them varies greatly in different cities. Mathematics, the classics, the sciences,—all have approximately the same amount of time allotted to them in the schedules of widely separated schools. A diploma bears with it the understanding that these subjects have received due attention in the courses leading to graduation. In how far is this true of drawing, and more especially of freehand drawing?

In our own state the drawing course is usually optional in the high school and the instructor is granted possibly two and a half hours all told in a week during which to accomplish the work with his classes. It may be of interest to review what other states are doing in this matter.

Denver, while not generous in the time allowed for the drawing classes, being only ninety minutes a week, *requires* all students to spend at least one year in the high school drawing course. For this one-half credit is allowed. Two years of optional courses in drawing follow with the same schedule and credit.

Minneapolis devotes eighty minutes a day to drawing throughout a four year course, and one full credit is given for the work.

St. Louis gives a double course; one, The Art and Commercial Art Course has daily periods of ninety minutes each, while the Art and Household Art Course demands two ninety minutes periods weekly.

The Technical High School in Cleveland presents a two years' course in Applied Arts that is granted from six to ten periods weekly.

In the Philadelphia Girls' High School, a three years' course of College Preparatory Drawing and a four years' General Course in Drawing are each compulsory and graduates from either one of these courses are ad-

mitted to two local art schools without the formality of an entrance examination. The time devoted to the high school drawing is two periods of fifty minutes each week for the year and one period a week of the same extent during the remainder of the course.

Indianapolis grants eighty minutes daily for drawing and full credit is given as long as a student continues the course.

From the Pacific Coast, the Stadium High School in Tacoma, Washington, comes the good word of a prescribed two years' course in freehand drawing with one and a half hours daily and one credit given for each year's work. Two years of an optional course follow the required time.

Cincinnati High School uses as its motto:

> "So enter that ye may be serious and thoughtful,
> So depart that ye may be of service to mankind,"

and as applying this aim gives a Girls' Art Course that is more generously endowed than any others so far cited. It is a four year course to which are given ten periods per week.

The Washington Irving High School in New York City presents a Technical Art Course extending over two years, the first year devoting nineteen forty-five minute periods a week and the second year twenty-one periods of the same length weekly.

In contrast with the schedules quoted, Michigan's meager time allowance for drawing seems even more limited. With the encouragement now given by our university does it not behoove us to keep a high standard for the high school drawing? To realize this, freehand drawing should be made an established part of the required curriculum, and more time be granted in which to accomplish desired results.

MANUAL TRAINING CONFERENCE

THE FUNCTION OF MANUAL TRAINING FROM THE VIEWPOINT OF THE ENGINEERING COLLEGE.

DEAN M. E. COOLEY, UNIVERSITY OF MICHIGAN.

Dean Cooley said in part, that the world was in need of men who could do some specific thing as a means of livelihood, the industries required well trained men. He held that manual training was not the proper preparation for engineering, first, because the engineer goes out into life to engage in manual training, or work; second, because he needs the broadest possible education for the great problems he will have to solve. Latin and Greek give the basis of our make-up in history, arts and sciences. The engineer of today needs the graces and culture gained from a study of the classics.

MANUAL TRAINING FROM THE MANUFACTURERS' VIEWPOINT.

MR. RALPH W. DAVIS, CADILLAC MOTOR CAR CO., DETROIT.

In the few words that I shall use in discussing the topic assigned to me there is no intention or authority to speak for manufacturers in general, as I speak only from my own observations at various shops or conclusions arrived at in occasional conversations with different persons engaged in manufacturing.

In order that we may work on the same basis I will say that by manual training in this discussion I mean the teaching of elementary handicraft in the public schools of pupils of from 10 to 18 years of age and more especially as taught to high school pupils.

This manual training is taught in the schools for some one or all of the following reasons:

1. To educate the entire brain area.
2. To prepare a broad foundation for future engineering study.
3. To assist the youth to find their best point of contact with their life's work.
4. To open up a wider field of effort to the ambitious boy and in the effort to develop a practical utility it has become one of the great present day problems.

The great strides made in the industrial world during the past decade have brought us face to face with new problems . These problems while being of an economic nature were and are so vital to the new order of things that instant decision was in many cases imperative and for these decisions we have had little or no precedent by which we might be guided. I will not attempt to narrate these many vital problems, but Manual Training as we see it in the broad scope now in vogue is decidedly an off-spring of this new industrial organism and the consequent rapid centralization of population in our large cities.

Our grandparents and most of our parents became more or less familiar with handicraft through the very necessities of life. In the earlier days the all-around mechanic was usually the man who handled tools for years probably before he entered a shop. It is true that the apprenticeship system was in vogue, but the great bulk of mechanics did not serve the many long years then required. Most boys of that period spent hours in a village smithy or a gun and locksmith shop while another favorite resort was the carpenter shop or the vicinity of the building being erected, so that every boy became familiar with tools and the customary methods of handling them even though he might not follow such work. While the girls of that period were expected to sew, cook and weave and learn the multitudinous duties which fell to the lot of the housewife, and it is well known that the

average girl of the earlier periods had a far wider range of practical subjects than our girls of today, thus there was no reason for adopting the elementary handicraft or manual training in the Public Schools.

With the development of the large manufacturing establishments came the necessity of improving machinery, and finally the automatic machinery. The demand for men became enormous and soon the comparatively few old school mechanics and also near-mechanics were absorbed in the new industrial maelstrom and it was evident to those hiring men that some steps would be necessary to provide the men who would be needed in the almost immediate future. This was especially impressed upon those who have what is known as the "long-look-forward." We then began very shortly to hear of all sorts of Technical and Training Schools projected and also the Manual Training idea for the Public School took on sudden impetus, and while it cannot be said that this was a universal movement yet there are very few schools of any standing in which this idea has not been tried out in some form or another, and eventually the National Society for the Promtion of Industrial Education was organized as part of the effort to get these many forces to operating in the same general direction, consequently we should now be getting decisive results from this training of the school boy during the past ten years. This I believe brings me squarely to the subject as to just what results the manufacturer can see in his factory from the past ten years of manual training. It is such a truism that in all matters the attitude we take toward any subject will determine to a great extent what we see while investigating the subject, that I ought to discuss for a moment just what should be the manufacturers' attitude toward manual training. Taking the first thought and considering the theoretical manual training student as meeting the theoretical requirements of the school, it is evident that the manufacturer should welcome the student in his factory without reservation for the idea of getting bright young men with a basic training in handicraft and at an age when they would be pliable to the ideals of the factory, would appeal to the Manager or Superintendent who was desirous of building up a loyal and efficient organization, and with such an idea I believe the manufacturer is in hearty sympathy. Unfortunately, however, these ideal graduates have not appeared in our shops in any appreciable numbers. The distance from the High School to the factory is apparently so great that our records do not show that many have arrived. We presume they are somewhere on the way. We cannot therefore give any data complete or otherwise concerning the comparative efficiency of the apprentice and the manual training student and such efficiency is naturally the first thought when considering a proposition from our view point. I can thus close my first point by saying that the manufacturer should be in hearty accord with the theoretical manual training work.

But we also find when a Factory Manager or Superintendent is approached on this subject he is either indifferent or else is inclined to be very pessimistic concerning the value of Manual Training. Now there must be

a reason for this attitude, as it is contrary to what seems to be his own best interest, and I will now endeavor to bring out some of these untoward influences.

So far as we can discover few High School graduates are in our shops, you will say that it is "Because they have been fitted for better work," and I say at once, "What do you mean by better work?" You will point to bank clerks, office men, store clerks, etc., and I observe that these are all white shirt jobs with manicured hands. That is all right, men are needed in such work but my point is that in school and home the emphasis is laid on the ladylike jobs, this is an exceedingly prevalent notion. Just a couple of days ago in my own office it became time to send one of our Cadillac students from the Drawing Room into the Shop, he by the way is a High School Manual Training taught boy, very fine in mechanics. When he received his transfer slip I overheard the other young fellows saying, "Now you'll have to get your hands dirty," and "You'll look sweet in overalls." Now this was good natured chaff, but under it all was that same thought that clean work is the only kind for trained men. Another decisive point in keeping the Manual Training student from our shops is that unfortunately the average High School student is not desperately hard pressed along financial lines. He takes Manual Training because of necessity and it helps in his counts, but fond parents make much ado when his clothes and hands show signs of "dirty shop work" and mother thinks it is "awful" while father says "his son won't have to work like that," and can you expect the boy to rush towards our shops when he graduates, and if perchance he does in isolated cases, he is always ready to quit (and does quit) when work becomes work and not a new experience.

The boys we get in our own Cadillac School seldom have reached High School, and it is usually essential that they keep working in order to help out at home. It is this type that really need Manual Training and we would be glad to see them get it in School. Again, in a way we help to foster the wrong idea in the boy, by expressing surprise when a student seeks work, and wonder why he doesn't go to an Engineering College, and boys get inflated estimates of themselves unconsciously.

Take this experience of a friend of mine who is at the head of a very large concern in Ohio. Personally he spends four or five nights a week in his office and factory up to 11 o'clock, it seems that a son of a friend of his became employed in the factory unknown to this gentleman, and the boy's mother in conversation with the President's wife said that if learning this mechanical work would necessitate her son working such long hours as this Big Man did, that she was going to put him in some other line of work. She absolutely failed to realize that in order to attain and make the success that this man had made that these long hours were part of the price he had to pay and the same might be true in any line of work in which she wished her son to succeed. This gentleman also told me that it was pathetic to see the boys coming into his factory from High School supposedly trained, and

yet had no sense of values or the necessity of observation. He personally takes one of these boys on cross country trips with him for a day or two at a time, and while on these trips experimenting with fascinating material he does not notice the dinner hour nor does he notice whether it is night or day. For this reason nearly every boy he has taken with him has failed to grasp the fact that much might be learned from this sort of work and they have complained to their parents and friends that this man would not stop at 12 o'clock to eat and that he would get out and get under the car in a rain storm when the car was running all right and they thought he was almost crazy, and that he would drive all night! While the man himself was obtaining material of great value, the boy likewise might have been adding to his fund of knowledge, and my friend is convinced that the students are not impressed with the value of observation and common sense. Being in constant touch with boys and young men I will admit that lack of keen observation is a very common characteristic.

In the factory this fault may cost money or endanger lives, but observation and attention can be cultivated.

Another fault which is prominent in the young men who enter our shop is the lack of appreciation of the joy of work, instead of having a burning desire to conquer an obstacle, the boy will take the easiest way, which is usually a slip shod line, and the moral and mental stimulus of overcoming a difficulty is lost to him.

The attitude of the parent and teachers while the boy is doing Manual Training work will to a great extent determine the attitude of the mind towards meeting difficulties. The tendency being too often to make it easy for him to overcome these difficulties in order that he might hurry on to some other points which might seem more important so that when the boy is put up against the problems of the factory his tendency is to ask for help rather than find his own way out. I also believe that in the effort to make the needed points in order to graduate both pupil and instructor will skip details and do superficial work, which is a mighty bad hapit in the shop.

What I have said will indicate to you our general view point on this subject, and I would like to close by suggesting certain points which might tend to raise the efficiency of the Manual Training student.

First.—Hammer into the student that there is only one way to do anything, and that is to do it *right,* this is one of the constant slogans of our Advisory Manager, Mr. H. M. Leland, and he spells it slow and with capitals, R-I-G-H-T. That cuts out "almost," "near enough," and their cousins. Work so done is quickest, best, and usually least expensive. This will also check the instructor who is willing to pass poor work in order to graduate more students.

Second.—Magnify the dignity of labor and work. Do not always point to the soft snap men as examples of success but refer often to the A-1 workman, who can do the best work. I know many workmen who refuse

to take a position as foreman, because their skill enables them to earn more money than a foreman receives.

Third.—Discourage the idea that money received is the *whole* aim of work. The man who does only as much as he is paid for, never gets paid for doing any more. It often happens in my work that a man is advanced to higher grade work or responsibility and if he at once asks "how much more pay will I get" he has marked himself for very close scrutiny for we question his loyalty. Those High School graduates who apply at our Employment Office are very particular about the kind of work and the pay for same. We are looking for the man who lands his job first and then shows us how much we will have to pay to keep him, note I said "shows us" and not "tells us," there's a difference.

Fourth.—I detest the popular fallacy that says "Why any one of you boys can be President of the United States." It is not so and every live boy knows it. Likewise you will point to eniuses like Edison and Westinghouse and tell the boys who are in your charge that any of them can be likewise famous. It is not so, but each one can be a success if he will measure success by his ability and determination. This would tend to show them that advancement in a good shop is not of sky-rocket order. Many articles in recent years which show the apparent rapid rise to power of certain men are absolutely dangerous and false, for they emphasize the short time of rise, and do not show the hours and weeks of hard preparation.

I believe that this is enough from my view point, probably you have expected me to lay out a suggested course of instruction, or recommend certain lines of work, but I feel that the present day Manual Training teacher and superintendents, handicapped as they are by limited appropriations and salaries, are nevertheless making great improvement in their work and as each innovation passes into the limelight of practical criticism it will surely result in more close accord between School and Factory.

THE FUNCTION OF MANUAL TRAINING IN THE HIGH SCHOOL.

SUPERINTENDENT E. C. WARRINER, SAGINAW.

It is now too late to theorize as to the value of manual training in the high school. We have been giving this instruction long enough to have a body of experience available to tell us what its function is from actual demonstration of what it is doing in the lives of our students. I was glad to comply with the request of our chairman to speak here today, because it gave me an opportunity to gather data in regard to the influence of the work of the manual training department of our High School. I have accordingly

asked these questions during the past two weeks of all the boys who have taken the machine shop course in our High School since our manual training department was opened in 1905. The questions are as follows:

1. What value do you attach to the manual training work which you had in our schools?

2. What is your present occupation?

3. Do you find that the manual training work you did in school is of any practical help to you in your occupation now?

My contribution to the discussion will be quotations from the replies received to these inquiries. A large variety of occupations is represented among these young men, as follows:

Tool making and Machinist	4
Engineering	4
Automobile Business	3
Draftsman	8
Plumber	1
Electrician	1
Foreman Saginaw Mfg. Co.	1
Claim Clerk	1
Telephone Business	1
Student	
Michigan College of Mines	2
U. of M., Engineering Dept.	4
U. of M., Literary Dept.	1
U. of Pa.	1
M. A. C.	1
Purdue	1
Saginaw High School	1
Lumber Salesmen	9
Shoe Clerk	1
Farmer	1
Office Work	4
Seed House	1
Milling	1
Hardware	2
Auditor	2

Taking up the letters, the first is from a machinist who writes: "The value to me has been about three years of my life saved as an apprentice. For instance, the Carborundum Co. of Niagara Falls, N. Y., paid me on leaving school $15.00 a week and I was with them for eight months. I then transferred to the Aluminum Co. of the same city, and received $18.00 per week."

This is from a machine tool designer: "The training that I received in the manual training department of the Saginaw High School was of in-

estimable value to me during my college course. It gave me a better understanding of the various problems presented and also the ability to judge whether or not they were commercially practicable. That training influenced me greatly in the selection of my college course."

This is from a tool maker at the Chalmers Motor Co. of Detroit: "I wouldn't take a whole lot for the practice I got in the manual training school, because if I hadn't the training I would be serving my time yet and probably getting $1.50 or $2.00 a day where by having the training, I have a good job and drawing 40c per hour, and then it is easier to get a job, for they always ask if you can read a blue print. I tell them yes; sometimes they try you to see whether you really can or not. It is easy for me because I made several drawings there and got the idea which makes it easy to learn to read them."

The proprietor of the Valley Auto Supply Co. says: "I believe manual training has a great influence in helping one to choose an occupation."

A draftsman in the Engineering department of the Edison Illuminating Co. in Detroit writes: "The training I received in mechanical drafting was equal to at least two years of practical experience in my present occupation."

A plumber in our city who passed the plumber's examination with high standing says: "I think you will understand me better if I give to you a few practical examples, and I know I can explain better to you how it helped me. For instance, mechanical drawing has enabled me to read readily any set of plans, etc., that has ever come to me in my work, and I do work from a great many different sets. I have often used my knowledge of forging which I received in school in tempering, etc., and have often made actual tools such as chisels, bars and caulking tools. In the same way I have been able to do an occasional job of machine work, which will turn up in the course of time in my line. Also make small patterns and in the latter, my wood turning has been of the greatest value." "I consider my manual training in school as benefiting me or rather crediting me with at least two years actual outside work. I cannot imagine anything which could supplant it and take the place in after life."

A journeyman electrician writes: "It was the information and experience I gained in the manual training department, that enabled me to take my first position when I worked after school and during vacation." "While I cannot say just how great the help is, from the manual training, I am sure it has benefited me quite a little as I have some carpentry work to do and a great deal of taking apart, repairing and rebuilding electrical apparatus."

The foreman on the wash board floor of the Saginaw Manufacturing Co. with ninety men under him speaks as follows: "We manufacture wash boards and the Gilbert splitwood pulleys. The manufacturing of these involves the use of a great variety of wood-working machinery besides there is a fully equipped machine shop. You can readily see my training along the line of wood work, foundry and machine shop work in the schools gave me a great insight into the work I have chosen."

Here follow quotations from the letters of several students in higher institutions of learning: "I am a student at present, but for three years after leaving high school I was employed surveying on irrigation projects. The manual training is of no particular help to me now as a first year student, but while employed in irrigation surveying, the knowledge gained in the work was very useful as we were thrown to a large extent on our own resources for any construction or repairs necessary around camp."

A student in the Michigan College of Mines at Houghton gives this comprehensive answer to my questions: "Because it is an excellent method of teaching a student the necessity of clear thinking and logical reasoning, because all mistakes show up so clearly before he finishes his piece of work. No other courses in the school show this point so well as manual training. Because it is the first course in which a student is required to use both his head and hands at the same time. It teaches him how to handle tools and this is much more easily learned when young than later when one's time is more valuable. Because it teaches a student technical terms and the names of different parts of machinery and even though his subsequent work may not bring him in contact with machinery directly, yet in this day and age one can hardly escape it. By being familiar with different terms applied to mechanism it is much easier for a person to express himself when describing anything. Because it teaches a student to show by sketch what he means which is often both shorter and more expressive. It gives a man an idea as to the time required to turn out a piece of work which is most useful in after life. For anyone who intends to take up engineering in college it is a big advantage because it is the only course given in high schools which will give a student any advanced credit in college."

A present student in the Engineering Department of the University of Michigan gives the student's point of view as follows: "Manual training is essential for all engineers. The work which I had while in high school was accepted in the Engineering Department as equivalent to their courses in shop work and I received twelve hours advanced credit in manual training. This meant a considerable saving of time as well as shop fees."

Another Ann Arbor engineering student says: "Granted that a student in high school will first elect those academic studies which will according to his or his advisors' judgment be the most useful to him in after life and that a certain amount of time left will either be put on other academic work of lesser importance, or on manual training, in my opinion that time spent upon manual training is of infinitely much more value than it would be spent on the other academic work, whatever it might chance to be. The manual training which I received in Saginaw has helped and been of benefit to me in the following ways: It gave me enough of an idea of shop methods of construction to enable me to hold down jobs during my school vacations which I could not have held had I had no such training. It netted me twelve hours credit here in the Engineering Department and let me out of all the elementary shopwork courses in the mechanical course. As a

student in engineering, shop work enables one to take more of an interest in certain courses which without a little knowledge of shop and construction practice would appear perhaps very impractical."

A Freshman Engineer at the Michigan Agricultural College writes: "The manual training work I received in school helps me very materially now in college. In school I received the correct impression of what those things meant. Now I do not have to study the elements but can go ahead getting a broader and more comprehensive view and knowledge of the part they play in engineering, and of the things themselves. Outside of my college work, the manual training work received, made it possible for me, this last summer, to obtain work when "times were dull" at the rate of 35c an hour. This was in an automobile factory. It made it possible for me to work with men who had been at the automobile assembling and engine repairing trades for three and four years at the least."

A Senior in the University of Michigan Engineering Department writes with a wisdom beyond his years: "Overlooking the case where it is of direct benefit to the student leaving school, I still think it of great value. The training it gives a young man in doing things, actually making something with his own hands, is important. It prepares him to do little odd jobs that come up around the house. This in turn develops self reliance, teaches him to do things for himself, rather than to call on some one else for every little thing. This training at the age of the beginning of high school students I believe very important."

A few quotations follow from young men not immediately concerned with mechanical pursuits.

A lumber salesman says: "My manual training course has been of as much benefit to me as anything I studied in my whole 12 years in school."

A farmer: "I am a farmer and find the manual training work I had makes me more adaptable to repair and understand machinery and tools, erect buildings and other such things that happen on a farm."

A salesman for the Lufkin Rule Co.: "The experience gained in my manual training work, is of greatest value to me in this way. I have a general idea of the nature of the work, which can be accomplished on each machine in a machine shop. The completed product, which the Lufkin Rule Co. places on the market, consists of many small machined parts, assembled together. I am able to look at any of these parts and instantly decide how it was made,—the different operations performed and to estimate the amount of time and labor consumed in its manufacture. This is of value to me, because it gives me a more thorough knowledge of the goods which I am trying to sell."

A manager for the milling concern: "The manual training work has certainly given me very much practical help, as we handle incubators and all poultry equipment and as I buy all these things for above concern it is necessary to know about good workmanship and to be able to know the good points about these articles when selling same."

An auditor for the Electric Railway Co.: "The ability to see clearly matters connected with the operating end of a business that are bound to come up in connection with general office work of any kind."

I am rather proud of the returns from my questionnaire, because they prove conclusively to my mind, and also, I believe, to any unprejudiced inquirer, that the manual training high school is filling an important place in the life of the world of today.

To answer specifically the question implied in the title of this paper, I should say that the function of manual training in the high school is a practical function, or since the word practical is lightly esteemed in some parts of the educational world, I will say vocational, and this from three points of view. (1) The manual training work in a high school prepared young men directly to earn a living, as witness the tool-makers, machinists, draftsmen and electrician whom I quoted. (2) Manual training work is very valuable in vocational guidance, as is shown by the number of students who enter engineering schools. (3) Manual training is helpful to anyone in the business world which today more than ever before concerns itself with mechanics and mechanical appliances. The replies prove this from the lumber salesman, the farmer, the office clerk and the milling company manager. There can be no question as to the value of manual training high schools as shown by the experience of the young men who have written the letters from which I have quoted. Education today is much more broadly developed than it ever was before and it includes the training of the hand to industry as well as of the mind. That is the function of our manual training high school.

EDUCATIONAL PSYCHOLOGY CONFERENCE

VALUE OF PSYCHOLOGICAL TESTS IN DETERMINING LIFE VOCATION.

PROFESSOR C. S. BERRY, UNIVERSITY OF MICHIGAN.

Only in recent years have we come to see in a pragmatic way that by birth we are neither free nor equal. And with the recognition that environment is not to be held responsible for all individual differences has come the attempt to minister to every child according to his needs, to give every individual the opportunity of developing as fully as his nature will permit. But to do this we must know what those needs are. Along with the specialization of schools has gone the problem of determining who are to take these vocational subjects, who are to enter these special schools. As long as environment was looked upon as the all important factor external circumstances and not inherent ability decided who should enter the special schools,

who should secure a high school education and who should go to college. Every individual was led to think that he was a potential president, and if he did not become president it was simply because he preferred to turn his attention to matters of greater importance.

But not only have we come to recognize that individuals differ by nature but also that there is uniformity in the distribution of these differences; that some, a small per cent, have a great deal more ability than the vast majority, that others, also a small per cent, have decidedly less ability than the great majority, and that all the rest differ from one another in ability only to a slight extent. With ability distributed in such a way that most people are very much alike, it is not surprising that in the past we have laid the emphasis on environment, for our industries had not become specialized, vocations had not multiplied. In other words, the specialization of labor had not yet become such as to call out, to any marked extent, the slight individual variations, which are now seen to be so important that they often spell the difference between success and failure. With this marvelous specialization there is a demand for ability of every kind, and to the extent that individuals differ in natural endowment that difference is made plain in these specialized industries. Then furthermore, in any given vocation the competition has become so great that the individual who by nature is only slightly superior has a tremendous advantage. If the man of superior ability is receiving an education which is to fit him for his work how can the man of inferior natural ability, as far as that particular line of work is concerned, hope to compete successfully with his more able competitor?

We have goon reasons to think that, at least in our society, there is about as much native ability among the children of the poor as among the children of the rich. If such is the case then the loss to society is something tremendous in allowing environmental conditions, instead of inherent ability, to determine what kind of education the child shall receive and what kind of vocation he shall follow.

While educators have insisted on vocational training, insisted that vocational subjects should be introduced into our schools, have insisted that vocational schools should be established where every individual might be educated according to his needs, they have also during the last few years begun to sense the problem of vocational guidance, they have begun to see that the boy left alone to work out his own salvation is not very apt to be saved.

And to Boston belongs the credit of making the first systematic attempt in this country at the solution of the problem of vocational guidance. Stratton D. Brooks, who was superintendent of the public schools of Boston at the time of the inauguration of this movement, gives the following description of the way the work was started: "Boston is fortunate in having a group of liberal-minded men and women through whose generosity the Vocation Bureau has been established and maintained. The Boston School Committee has invited the co-operation of the Vocation Bureau and the director of this Bureau has worked hand in hand with the Vocation Direc-

tion Committee of the Public Schools—a committee appointed by the superintendent and consisting of masters and submasters in the Boston schools. Among the many activities of the Vocation Bureau, I mention three: first, the investigation of conditions in the trades and businesses of Boston. The Bureau has undertaken to prepare material for the use of pupils, parents and vocational counselors that will furnish the best available information with reference to the vocational opportunities that exist in Boston. Second, the Vocation Bureau is conducting in one of the public school buildings a school for vocational counselors wherein teachers and others who are interested in this important work may pepare themselves for the better performance of their important tasks. Third, the Vocation Bureau has brought about a cooperation of effort whereby various organizations have undertaken to perform needed services without duplication of effort. . . . In the schools themselves many things have been done at the suggestion of the Committee on Vocational Direction, chief among which is the appointment in each high school and elementary school of one or more vocational counselors. These counselors have been selected by the principals with reference to their interest in the work of vocational direction, their skill in determining the abilities and possibilities of the children, and their willingness to devote extra time to acquiring information and perfecting themselves in the successful performance of their duties. Meetings of these counselors have been held for the purpose of discussing the problems of vocational direction and considering how best to minimize its dangers and increase its beneficial results. Most of them are now taking a course of instruction arranged by the Vocation Bureau."[1]

Other cities have also taken up this work of vocational direction, and although different plans have been pursued in different places yet the consensus of opinion seems to be that a tremendously effective work is being done.

This work of vocational direction not only helps the boy to decide what line of work he will take up when he leaves school, but it also helps him to choose the school where he can get the education best suited to his needs. It provides him with a "life career motive" while he is getting his education so that he is not merely drifting but going somewhere. Then furthermore, it tends to bring the teachers into closer contact with life of the outside world, thereby vitalizing their instruction.

But even if the work, as at present carried out, does result in all this, it seems to me that something more is needed. Grant that the vocational counselors are wise teachers who are genuinely interested in the children whom they are instructing and at the same time studying, grant that these teachers are familiar with the various vocations which are open to pupils on leaving school, yet under these, the most favorable conditions, the teachers can judge only in a general way of the boy's fitness for the profession or trade that he is expecting to follow. If the vocational counselor takes school marks as a basis for her decision as to the ability of the pupil she succeeds

in getting only a general idea as to the level of his intelligence, even if the subjects studied in school develop all the possibilities of the pupil. For in the case of any three boys who have done equally well in their school work, judging by the grades they have received, we cannot say that by nature they are equally well fitted for the same vocation. For proficiency in a given subject may mean quite different things for different students. One may be proficient because of his reasoning power; another because of his good memory; and a third because of his superior industry. So the same grade which these three pupils receive may mean a different thing in each case. And when we bear in mind how many courses it is possible to pass with high credit if a student has a fine memory, even though he does a very modest amount of thinking, we readily see how little credit should be given to school marks as a means of determining a child's vocational fitness. This does not mean, of course, that school marks have no significance. They do have much value, but only in a general way. They tell us that the student has good or poor ability depending on whether he has received very good or extremely poor marks. But they do not tell us very much about the pupil's fitness for any specific kind of work.

But what makes the problem still more difficult is the fact that the majority of pupils in our schools get about the same marks. That is, there are more students who vary from one another but little in their grades than who differ from one another a great deal. That means, that the differences in mental ability are for the most part small, and for that reason in the earlier history of our country it did not make so much difference into what particular line of work the individual went as the demands were not so great but what he could make a reasonable success. But now with the specialization of work these little differences are of great importance.

But it may be objected that if the vocational counselor cannot determine the natural aptitudes of the student by his proficiency in his studies alone, she can at least determine his interests, can find out what he likes, and by making him acquainted with the various vocations she can find out which one interests him the most and in that way direct him into the vocation for which he is best fitted; the supposition being that the student has the most ability along the line in which he is most interested. For example, many of our musical geniuses showed a marked interest in music when they were children under five years of age. And this has been true not merely of musicians but of many other persons of extraordinary endowment along a particular line. This is doubtless the case as far as the few are concerned, as far as those individuals are concerned who stand head and shoulders above their fellows. The problem is simple in their case. Their particular talent is so great that it dominates all their other interests. Now this is just what does not happen in the case of the average or typical student. The so-called typical or average student has no one aptitude that stands out so prominently that it can readily be seen. This fact is clearly brought out when we consider the different line of work that the average student has thought of following

by the time he has become twenty-one years of age. Last year I asked sixty-six seniors in my classes to answer the following question: "Name in order the different professions or vocations you have wanted to follow at different times during your life." Out of the sixty-six were seven who had never considered but one vocation. All the rest mentioned from two to eight vocations. The vocations mentioned by one student are: "orchestra leader, nursery-man, writer, teacher of rhetoric, and haven't yet decided"; by a second student, "missionary among heathen, preferably cannibals, novelist, short story writer, librarian, school teacher"; by a third, "doctor, sailor, actor, lawyer, writer, teacher"; and by a fourth, "to be a lady of fashion, missionary, doctor, get married, social service worker, teacher, executive head of college."

Such replies may be interpreted in different ways. We may suppose that the choice changes with the knowledge of more vocations. At first, the individual is necessarily hampered because he does not know of many vocations, but as he learns of others he finds that he is more interested in one of these. If this is a true explanation then all that is necessary is to give the individual a knowledge of the various vocations and he will choose the one for which he has the most ability. I think this is true of the individual who is much more talented along one line than he is along other lines. We generally find that this individual makes a choice early in life and does not change. But evidently it does not account for all the changes in choice, because in a large percentage of cases the vocation which is finally chosen is one with which the youth has been familiar from his earliest years.

In the case of the typical individual do we not find that the budding interest is the one clamoring for exercise, even though it may not be accompanied by unusual ability as compared with the individual's ability along other lines? If this is true then we have an explanation of why it is that the individual's choice of vocation may change without previous notice. In this latter case the change is due, not to knowledge of other vocations, but rather to the dawn of a new instinct or interest. For is it not true that at certain period in the average boy's existence he has an ardent longing to be a solider? A little later the vocations which call for social service make their appeal. Now he would be a physician and heal the sick, or a missionary and save souls, or a great patriot and lay down his life for his country. Here the change is due not primarily to increasing knowledge, but to the development of a new instinct.

Thus we have no assurance that the vocation which interests the boy of fifteen will have an equal interest for him at twenty or twenty-five. In fact, the probability is that it will not unless it happens to be the vocation for which he has the greatest natural ability. In other words, the great thing is to discover the vocation for which the child has the greatest natural ability and then try to get him interested in that vocation. For in the long run the individual is happiest in doing that which he can do best, so long as it is the biggest thing that he can do successfully. This means that the study

of the interests of the child should be made not primarily with the view of getting the child to enter that vocation in which he is most interested, but rather to enable us to find the work for which he has the most ability, recognizing the fact that during the early years of life interest and ability are not always closely correlated except where the ability is unusually great.

But the problem is still more difficult when we bear in mind that the vast majority of the school children do not even enter the high school, but leave school when fourteen years of age to go to work. In other words, the boy is compelled to choose his vocation by the time he is fourteen, just as he is entering the adolescent period. Difficult as it is for the high school boy to decide wisely in regard to his life work, it is even more difficult for the boy in the eighth grade to make a wise decision, because, as yet, all of his interests have not manifested themselves. This means we are in the same position as the physician who is compelled to make a diagnosis of a disease before all the symptoms have appeared. To be successful he must make use of all possible sources of information. We cannot do less if we would succeed in enabling the boy to find himself.

But it may, with a certain amount of justice, be replied that the teacher who is to act as vocational counselor will not depend merely on the grades and interests of the pupil to guide her, but in addition she will have the pupil study himself to determine wherein he is strong and wherein he is weak. Perhaps a method of self-examination such as Mr. Parsons followed in Boston may be used. I think without question, some light in regard to the child may be obtained in this way, but at best a boy of fourteen is a very poor judge of his own aptitudes. In fact, it requires long training in a psychological laboratory before a person reaches the point where he can introspect and report accurately his introspections. Most adults do not even know, except in a general way their own particular abilities and weaknesses, even though the latter especially have been pointed out many times by their friends. Then after all, it is largely a comparative matter. It is a question as to whether the individual possesses less, equal, or greater ability than other individuals who are entering the same vocation. If he possesses less ability then the question naturally arises as to whether he does not possess some particular ability which he might use to advantage in some other vocation.

However, even though the parents, teachers and pupil concerned working together cannot determine with any high degree of accuracy the vocational aptitudes of the student yet they can accomplish much. They can determine whether the boy has unusual ability along any line of school work ; they can find out what his interests are; they can make him acquainted with the various vocations so that he will be prevented from making the egregious blunders that so many boys and girls have made in the past. Without question a large per cent of the boys who fail annually in the various departments of the University of Michigan and who are advised by the university authorities to honor the home folks with their presence might have

been spared this humiliation and disgrace if they had received the vocational guidance such as now exists in some cities. The teachers, parents and pupil concerned, all working together, can find out what sterling virtues that pupil possesses. They can determine whether he has general ability above the average, or any particular ability that is very marked; they can determine whether he possesses courtesy, tact, courage, honesty, perserverance, and the like, all of which are essential to success in most vocations. All of these things can be determined by them, and in this way complete failures can for the most part be prevented. But on the other hand, only the psychologist can determine the finer mental differences, which make the difference between success and getting along passably well, the difference between living and existing in a given vocation.

But the question has often been put as to whether psychology is able to give us any such light in respect to the subject's intellectual abilities. Professor Thorndike of Teachers College in an address before the Education section of the American Association for the Advancement of Science made the following statement: "Suppose the men and women of this audience were measured in respect to these eight tests, four trials of each being given (He gives the names and descriptions of the tests which I omit). The time required would be approximately two hours, say thirty minutes a day on four days chosen at random. From the combined score made by an individual in these eight tests, his general intellectual ability—his capacity, that is, for science, scholarship and the management of ideas of all sorts—could be prophesied with a surprisingly small error." And further he says: "It will not be long before the members of this section will remember with amusement the time when education waited for the expensive test of actual trial to tell how well a boy or girl would succeed with a given trade, with the work of college and professional school, or with the general task of leading a decent, law-abiding, humane life."[2]

Goddard in discussing psychological tests says: "Experience with these tests has continually reassured us not only as to their value, but as to their amazing accuracy. Their usefulness as a means of understanding the mental development of children is beyond question, and we confidently believe that the time will speedily come when every child in school will be occasionally examined by some such method as this with a view of determining his actual mental development, and consequently what can be expected of him. This, not only for the purpose of segregation and giving special treatment to those who are backward or feeble-minded, but that we may know those who are especially well endowed and those who have average intelligence, so that each may receive the instruction that his condition requires."[3]

But it is not necessary to quote authorities as to the value of psychological tests when it comes to mental diagnosis and prognosis. Are not psychological tests being used with marked advantage in our large cities today in classifying those children who are not getting along well with their school work? Are not psychological tests being used now in connection

with juvenile courts to assist the judge in forming wise decisions in regard to the cases? To use psychological tests in determining vocational aptitudes is not a new departure it is simply an extension of the work that is already being done.

Perhaps one or two illustrations of what has actually been done in this field will make clear some of the possibilities of psychological tests. Taylor[4] tells how in a certain bicycle ball factory the work of the girls was carefully studied with the results that the qualities most needed in this work were seen to be, besides endurance and industry, a quick responsive action. All the girls were now given psychological tests and those whose reaction time was found to be slow were discharged, and other girls with a quicker reaction time were employed. The result was the possibility of shortening the hours and of reducing more and more the number of workers with the final outcome that thirty-five girls did the work formerly done by one hundred twenty, and that the accuracy of the work at the higher speed was two-thirds greater than at the former slow speed.

Münsterberg made a study of several different vocations with the view of determining what particular mental processes or combination of mental processes are necessary for success in these vocations. For example, after a study of the work of street car motor-men he came to the conclusion that for success in this line of work normal senses, a quick reaction time and a peculiar combination of attention and imagination are necessary. He then proceeded to devise laboratory experiments for testing the subject with the view of finding out whether he possessed this needed combination of attention and imagination. The results of his experiments showed a far-reaching correspondence between efficiency in the experiment and efficiency in the actual service. In commenting on the results obtained Münsterberg says, "There can be no doubt that the experiments could be improved in many directions. But even in this first, not adequately tested, form, an experimental investigation of this kind which demands from each individual hardly ten minutes would be sufficient to exclude perhaps one-fourth of those who are nowadays accepted into the service as motormen. This twenty-five per cent of the applicants do not deserve any blame. In many other occupations they might render excellent service; they are neither careless nor reckless, and they do not act against instructions, but their psychical mechanism makes them unfit for that particular combination of attention and imagination which ought to be demanded for the special task of the motor-men."[5]

One great difficulty at present in determining vocational aptitudes by means of psychological tests is that we do not know just what mental qualities and combination of qualities are essential to success in many vocations. However, as I have already pointed out, enough has been done to show the value and importance of this work. And fortunately much of this work has been done where it will count for the most, viz.: in those vocations which boys and girls of fourteen commonly enter. We now have enough knowledge of the psychological characteristics essential to success in many voca-

tions to be of great help, if that knowledge were only made use of. Why should not our psychological clinics which are being established in connection with our school systems enlarge their work to include the examination of boys and girls with the view of determining their vocational aptitudes, instead of confining their attention solely to backward and defective children? In this way the psychologist could supplement the work of the vocational counselors. He is not to take their place, but merely to assist them in making a more accurate diagnosis and prognosis than they could possibly make without his assistance. In this way a start could be made and the work would grow as it proved to be of value.

PRACTICAL PSYCHOLOGY APPLIED TO TELEPHONE OPERATORS.

MR. R. C. SACKETT, TRAFFIC SUPERVISOR, MICHIGAN STATE TELEPHONE COMPANY.

The man today who is not a vocational misfit is indeed lucky. And by man I mean all classes of laboring people both male and female.

Prosperity, and industrial and financial growth have come so rapidly in the past decade or two, that little or no attention has been paid to the proper relationship existing between the Man, the Job and the Boss. The average employer has always selected his men by chance or at least by guess. A man is employed because of some relationship to a foreman or because of his nationality, or because of his religious tendencies. Time, money and the best brains of industry have always been put on the material equipment, apparatus and plant in general. But times are changing and owners are beginning to look to the person who can size up a prospective employe and tell for a certainty whether or not that man is going to be an asset or a liability to the company in the particular position or job for which he is being considered.

It has only been in the last year or two, since business has reached that high stage of development, in which every small economy counts in order to successfully meet competition, that business men have begun to investigate such things as the high percent of resignations, failures and dismissals in their force, and have begun taking steps to ascertain their causes, and if possible secure the right man for the right job. Every man should be in the place in the world for which he is best suited.

Plenty of jobs and positions are waiting for the right man on every hand, but on every hand there is an over-supply of mediocre aspirants. It is very seldom that a man who fails in his chosen vocation and is thrown out, happens to find a career in which he can make a success. Statistics

show that there is an increasing burden and danger being thrown on society by the great numbers of those who do not succeed and who by their lack of success become embittered and discouraged.

The consideration of resignations and their causes in The Michigan State Telephone Company, together with a very interesting address and practical demonstration given at a noon-day luncheon in the city of Saginaw last April, led me to begin the study of this problem in the interest of our company. The address and demonstrations were on the subject of "Character Analysis as a Method of Selecting Employes" as advanced by Dr. Katherine M. H. Blackford of the Emerson Co.

When I say that the resignation in our force of telephone operators in the State of Michigan run between 90 and 100 per cent per annum of our entire force, and that the average period of service is about 20 months, you will readily see that there is opportunity for such work. But this company is only typical of thousands of others.

I approached the study of Scientific selection from three angles, namely:

I. *Graphology*—or the science of reading character from handwriting.

II. *The Science of Character Analysis*—to which I referred a moment ago.

III. *Practical Psychology*—of which I am to say something today.

I wish to just touch on the first two subjects mentioned before taking up this last phase.

Of Graphology I will say that in the short time I have been investigat-it, I have only been able to get a few of the essentials in mind. An illustration or two will serve my purpose. I picked a girl over in Grand Rapids for the position of Record Clerk in our organization, from the characteristics shown in her handwriting. And she has made good. Then, again, after our Chief Operator had received the written applications of three new operators and engaged them, I examined these applications and from the handwriting told the Chief Operator what I thought she could expect from them in actual service, and they have performed according to the way I predicted.

As to the second subject, Character Analysis, which bases its conclusions on a few natural characteristics, such as texture, form, color, body build, proportion, consistency and expression, I have made some general observations, and am prepared to say that I believe it can be applied in selecting telephone operators.

As to the third, and for our purpose the most important phase of the question—Practical Psychology—I have a good deal to say.

The experiments which I will describe were performed by myself, in Grand Rapids during January and February of this year.

The first step necessary in properly selecting any employe is to determine what the requirements are for the position for which he or she is applying.

Every girl cannot successfully fill the position of a Telephone Operator. If she does she must be able to sit facing a switchboard for two periods of four and one-half hours each day, with a fifteen minute relief in each period, and answer from 200 to 250 calls an hour.

The everyday examination of applicants requires them to successfully submit to tests of hearing, enunciation, eye-sight, education and general appearance. After this they are put through a regular school under a competent instructor before being allowed to operate a switchboard. The actual cost of training an operator is in the neighborhood of $100 and when you consider that in one city in this state 26 new operators are taken on each week, you can see that the most efficient selection is necessary to get the longest period of service.

There are many steps in the psychological process of an operator. Not being a psychologist and never having studied the subject, I could merely pick out in the shortest possible time what I considered essential for a good operator. I determined upon seven essentials and selected simple tests for them. The essentials are:

Attention, Association, Memory, Intelligence, Speed, Space—Perception, Accuracy.

Of these I consider Attention by far the most important for operators handling local exchange calls. For it is now evident to me that many of our girls who become nervous and leave the service, do so because it requires an excessive physical and mental strain on them to sit for hours and confine their attention to the work before them. On the other hand Memory is the most essential characteristic for a Long Distance Operator or an Information Operator.

The next thing necessary in a study of this kind is to determine standards to work with. These could best be obtained by testing experienced and efficient operators. And I might say that I am still working on standards, although I have used a few new and inexperienced operators.

For "Attention" I used the test of crossing out the small letter "a's" in a given text. The same issue of a newspaper and the same text was used throughout. The exact number of "a's" in the text was known, so that it was only necessary to time each operator with a stop-watch and count the number of "a's" crossed out correctly and incorrectly. A formula was then used to compute the result.

The "Association" test was that of reading a series of six words and having the operator write down the first word which came into her head after hearing the words pronounced. I took the time required for each word in fifths of seconds and added them.

The "Memory" test was that of reading a set of six numbers, two of which contain 8 figures, two 9 figures, and two 10 figures. The operator wrote down each number as best she remembered it, and after it was read. There were 54 possibilities of error and from the results of each I determined the percentage error.

The "Intelligence" test consisted in first reading a series of word-pairs consisting of words which naturally go together. There were twenty pairs. Then I read only the first word of each pair, and had the operator write down only the last word of the pair. A percentage figure was determined in this case.

The "Speed" test was that of sorting a pack of cards into four piles one at a time. The time consumed in seconds and fifths was used in this case.

The "Space-Perception" test was that of bisecting first one edge and then the other edge of a piece of paper by a pencil point, judging the distance entirely by the eye. The error in very small decimals of an inch was used in this case.

The "Accuracy" test was that of placing a mark as near as possible at the intersection of two fine lines in the centers of 10 small circles arranged in definite order on a vertical board; some of the circles being at full arm's length, others at half-arm's length, and others at short-arm's length. Both right and left arms were used. This was done with as much speed as possible and accurately as possible. The time in seconds and fifths, together with the number of marks placed outside the small circles were used as factors in a formula, in computing the result.

It was then necessary to strike a relationship between each of the tests and give them each a value. I gave each test a maximum value based on the minimum error. Two bases were used, one determined from the requirements of a good local exchange operator and the other from the requirements of a good long distance operator. The sum of the maximum number of points possible for the seven tests, gives 100 or 100 per cent efficiency for each rating.

The points assigned are as indicated by Table "A." I then arranged a Table of points for each of the seven tests, ranging from the maximum number of points allowed by that test with a minimum error, to zero points for the maximum error allowed. The sum of the points made by an operator for all of the tests would equal her efficiency for the whole seven tests, or her total points out of a possible 100.

These tables "B" to "H" inclusive will show you the values as I have just explained.

The results actually obtained from the tests are shown in Table I. The records are those of both local and long distance operators. I have designated local operators by capital letters, and long distance and special operators by double capital letters. This table is arranged in order of rank according to the proficiency shown by each in the tests. You will note the figures which are the averages of all the operators for each test. All operators falling below this average in any test are shown by a minus sign before the figure.

I will now take a few distinctive cases. First that of "A" who heads the list with 78.6 points as figured on a local operator basis and 77.1 on a

long distance operator basis. This young lady had been in the employ of the company only 3 weeks when the tests were made, and had just started working at a switchboard. From the time that she entered the operator's school, the instructor in charge repeatedly remarked that this girl learned the work faster and adapted herself to it quicker in actual practice than any student operator she had ever had. Her record in the tests bears out the statement of the instructor as you can see. Please note that she excelled in "Attention" especially, the most essential of all the tests. But unfortunately after such a fine start she became married and left the service. And I wish to say right here, that no employment system will ever anticipate marriage which is one of the three greatest causes for the resignation of operators. However, in six weeks this girl showed herself to be more efficient in actual service than 75% of all the operators in the service.

I will next consider "D." She had been in the service 1.5 years and is an excellent operator. You will note that she made a perfect record in "Intelligence" and fell slightly below in two other essentials. From that excellent Intelligence record and the good general average made I selected her to fill the next vacancy in our supervisory force and started her course of training for that position.

Operators "J" and "K" are god average operators and made records above the average in what I consider the three most important tests, namely, Attention, Memory and Intelligence. These two operators have been in the service one year.

I now wish to consider the last two on the local operator list. They are "P" and "Q" and are totally unfit. Both have been given notice on several occasions to show improvement within ten days or be dismissed. You will note they are way below the average in every essential. Neither one was dismissed because of their dire necessity for work. One of them did leave during the summer to take another position. She couldn't hold it down, however, so she came back.

We will pass up the local operators for a time and take up long distance operators.

Operator "AA" who made excellent records in almost every test, has been in the service 1.5 years and is one of our most dependable employes. She is given special work of various kinds which requires exceptional ability.

Operator "BB" is another very good operator and although only 7 months in the service she has shown marked ability and is being pushed forward to more responsible positions.

Operator "II" who has been in the service 8 months made a very poor record in the tests. She had been continually crowded in an effort to get her aroused to better work, but there was no response, and she left the service about one month ago, due principally to her lack of "Memory" and "Intelligence," the two most essential characteristics of a Long Distance operator. To train a new girl and get her rounded out to take this girl's

position will cost the company $500.00 unless the new operator is above the average. This is why scientific employment is necessary.

One more operator who is worthy of special note is "JJ." This operator is an Information Operator. Please note that she made the highest record in "Memory" of any girl tested. Of all the characteristics "Memory" is the most essential for an Information Operator. This girl was tried out as a regular operator but was unfit as her records show. Because of her good memory, she was made an Information Operator. Such a test as this made at the time she was first employed would have saved her and saved the company the unprofitable experience of trying to make a regular operator out of her.

Let me call your attention to the fact that 80% of the local operators who made better than average records, made a better record on the local operator basis of figuring than they did on the long distance basis. Also that 75% of the long distance operators made a higher record on a long distance operator basis than on a local operator basis. This is not merely a coincidence, it is what should happen. Furthermore, it is evident that the operators who made good in the tests have either made good in the service or have every indication of doing so. Later on I will point out that proficiency made in the service and in the most essential of these tests are practically identical.

As a rule it would seem that an operator falling below the average is unfit for service. This is generally true, but such exceptions as the very fine Information Operator who ranked first in the "Memory" test must be kept in mind.

Just before concluding this discussion, I wish to refer back to Table I. and say that by eliminating four of the tests used and keeping only those of "Attention," "Intelligence," and "Memory," the records made by every operator corresponds very much closer to the performance made in the service. I do not wish to say that "Association," "Speed," "Space Perception" and "Accuracy" are not essential characteristics of a good operator, but merely that the tests which I used for them did not give nearly as satisfactory results as those for "Attention," "Intelligence," and "Memory."

I can now consider only these three and go down the list and show you that every operator coincides in her record here shown with that made in actual service.

I, therefore, believe these three to be the bases for proper standards with which we can work, and unless I can find tests more suitable for the other four I shall not use them in future experiments.

In conclusion, let me say that while this experiment has probably accomplished very little and the results of all experiments which have been made in this work have barely scratched the surface; still each investigation of such a nature is opening new vistas, out of which is emerging what I believe to be one of the biggest unexplored and undeveloped fields for achievement in the industry of tomorrow.

VALUES GIVEN EACH TEST AND TABLES PREPARED FOR DETERMINING EFFICIENCY.

Table A.

TEST	MAX. POINTS ON MINIMUM ERROR	POINTS LOCAL	POINTS L. D.
Attention	4	25	10
Association	6 Seconds	10	15
Memory	0% Error	10	20
Intelligence	0% Error	15	15
Speed	20 Seconds	15	15
Space-Perception	0 Error	10	10
Accuracy	5	15	15
Maximum points possible		100	100

Table B.

ATTENTION RESULT	POINTS LOCAL	POINTS L. D.
4	25.0	19.0
5	23.4	9.37
6	21.8	8.75
7	20.3	8.12
8	18.7	7.50
9	17.2	6.87
10	15.6	6.25
11	14.1	5.62
12	12.5	5.
13	10.9	4.37
14	9.36	3.75
15	7.82	3.12
16	6.25	2.50
17	4.68	1.87
18	3.12	1.25
19	1.56	.62
20	.00	.00

TABLE C.

Association.

RESULT SECONDS	POINTS LOCAL	POINTS L. D
6	10.0	15.0
7	9.33	14.0
8	8.67	13.0
9	8.00	12.0
10	7.33	11.0
11	6.67	10.0
12	6.00	9.00
13	5.33	8.00
14	4.67	7.
15	4.00	6.
16	3.33	5.
17	2.67	4.
18	2.00	3.
19	1.33	2.
20	.67	1.
21	.0	0.

TABLE D.

Memory.

% ERRORS SECONDS RESULT	LOCAL POINTS	L. D POINTS
0	10.0	20.0
1	9.75	19.5
2	9.50	19.0
3	9.25	18.5
4	9.00	18.0
5	8.75	17.5
6	8.50	17.0
7	8.25	16.5
8	8.00	16.0
9	7.75	15.5
10	7.50	15.0
11	7.25	14.5
12	7.00	14.0
13	6.75	13.5
14	6.50	13.0
15	6.25	12.5
16	6.00	12.0
17	5.75	11.5
18	5.50	11.0
19	5.25	10.5
20	5.0	10.0
21	4.75	9.5
22	4.50	9.0
23	4.25	8.5
24	4.00	8.0
25	3.75	7.5
26	3.50	7.0
27	3.25	6.5
28	3.00	6.0
29	2.75	5.5
30	2.50	5.0
31	2.25	4.5
32	2.00	4.0
33	1.75	3.5
34	1.50	3.0
35	1.25	2.5
36	1.00	2.0
37	.75	1.5
38	.50	1.0
39	.25	.5
40	.00	.0

TABLE E.

Intelligence.

PER CENT ERROR	POINTS	PER CENT ERROR	POINTS
0	15.0	15	7.5
1	14.5	16	7.0
2	14.0	17	6.5
3	13.5	18	6.0
4	13.0	19	5.5
5	12.5	20	5.0
6	12.0	21	4.5

7	11.5	22	4.0
8	11.0	23	3.5
9	10.5	24	3.0
10	10.0	25	2.5
11	9.5	26	2.0
12	9.0	27	1.5
13	8.5	28	1.0
14	8.0	29	.5
		30	.0

TABLE F.

Speed.

RESULT SECONDS	POINTS	RESULT SECONDS	POINTS
20	15.0	40	7.5
22	14.25	42	6.75
24	13.50	44	6.00
26	12.75	46	5.25
28	12.00	48	4.50
30	11.25	50	3.75
32	10.50	52	3.00
34	9.75	54	2.25
36	9.00	56	1.50
38	8.25	58	.75
		60	.00

TABLE G.

Space Perception.

RESULT	POINTS	RESULT	POINTS
0	10	5	5
1	9	6	4
2	8	7	3
3	7	8	2
4	6	9	1
			0

TABLE H.

Accuracy.

RESULT	POINTS	RESULT	POINTS
5	15	13	7
6	14	14	6
7	13	15	5
8	12	16	4
9	11	17	3
10	10	18	2
11	9	19	1
12	8	20	0.

SYNOPSIS OF BUSINESS MEETING

April, 3, 1914.

The meeting was called to order by the President, J. M. Frost. The minutes of the last annual meeting were read by the Secretary and approved. Reports of the Secretary-Treasurer and Auditing Committee were made and accepted.

It was moved by Mr. Chas. McKinny that the Secretary write to the schools of the State to ascertain if there is a sufficient number of teachers interested in Domestic Science to form a Conference of the Club in that subject. The motion prevailed.

Upon a written request that the Club take some action looking to the removal of the Superintendent of Public Instruction out of politics Mr. Chas. McKenny moved that a committee of three be appointed to investigate the manner of appointment of Educational Officers of the State and report at the next annual meeting. The motion prevailed. The President said he would appoint the committee in the near future.

The President made a short address calling attention to the important things that had been accomplished by the Club and to the things that it might accomplish in the future.

Mr. E. C. Warriner moved that the Michigan Schoolmasters' Club hereby declares its belief that every high school teacher should pursue advanced studies equivalent at least to one summer school every four years. Carried.

Mr. Warriner moved that it is the sense of the Michigan Schoolmasters' Club that all institutions which are preparing teachers for secondary schools, should make provision for a practice or demonstration school to the end that every secondary school teacher who is granted a certificate may have had some opportunity for teaching under supervision while in training. Carried.

The report of the nominating committee was read and adopted and the officers therein named were declared elected.

Nominating Committee.

Chairman—S. O. Hartwell, Kalamazoo.
At Large—J. R. Bishop, Detroit Eastern, and
L. P. Jocelyn, Ann Arbor.
Classical Conference—Clara J. Allison, Owosso.
Modern Language Conference—W. W. Florer, University.
English Conference—Cornelia S. Hulst, Grand Rapids.
History Conference—T. P. Hickey, Western Normal.
Physics and Chemistry Conference—F. C. Irwin, Detroit Central.

Mathematical Conference—E. E. Gallup, Adrian.
Biological Conference—W. E. Praeger, Kalamazoo College.
Commercial Conference—P. R. Cleary, Ypsilanti.
Physiography Conference—Helen Martin, Battle Creek.
Drawing Conference—Alice V. Guysi, Detroit.
Manual Training Conference—E. C. Warriner, Saginaw.
Educational Psychology Conference—L. H. Jones,, Normal College.

Auditing Committee.

O. V. Adams, Ann Arbor, and Gertrude T. Breed, Ann Arbor.

Committee on Legislation.

D. W. Springer, Ann Arbor; E. A. Lyman, Normal College; C. F. Adams, Detroit Central; J. B. Edmonson, Jackson; W. G. Coburn, Battle Creek.

FINANCIAL REPORT OF THE SECRETARY-TREASURER, 1913-1914.

Receipts.

March 24	Balance as per last report, commercial Dept.	$	44.11
March 24	Balance as per last report, savings Dept.		23.41
Apr. 3	Deposit dues		200.00
Apr. 4	" "		277.00
Apr. 5	" "		30.00
Apr. 10	" "		46.00
May 3	" "		20.00
May 3	" sales of Journal		70.00
May 17	" dues		29.00
May 17	" advertisements		20.00
May 21	" sales of Journal		50.00
May 21	" dues		1.00
June 1	" interest		.34
July 29	" dues		13.00
Oct. 14	" advertisements		10.00
Dec. 1	" interest		.34
1914.			
Jan. 31	" advertisement		4.00
	Total receipts		$838.20

Disbursements.

1913.				
April 2	Check No. 254	Paul Color, delivery	$	1.20
April 4	" " 255	Dayton C. Miller, address		16.00
April 4	" " 256	J. G. Coulter, address		25.00
April 5	" " 257	L. P. Jocelyn, salary		200.00
April 7	" " 258	M. A. Bigelow, address		50.00
April 7	" " 259	S. W. Millard, badges, etc.		17.00
April 7	" " 260	N. H. Williams, miscellaneous expense		2.10
April 7	" " 261	Ann Arbor Press, printing		108.81
April 10	" " 262	Mack & Co., postal cards		.50
April 15	" " 263	Guss Ritz, lantern		2.00
April 15	" " 264	G. W. Baxter, doorkeeper		1.13
April 15	" " 265	John Maulbetsch, doorkeeper		1.00
April 15	" " 266	J. R. Simpson, doorkeeper		.75
April 15	" " 267	E. L. Fogelsonger, doorkeeper		1.05

April 15	"	"	268	S. J. Blashill, doorkeeper	.60
April 15	"	"	269	E. C. Burns, doorkeeper	.35
April 22	"	"	270	E. E. Calkins, stamps	6.00
April 26	"	"	271	Geo. Stevenson, doorkeeper	.90
April 26	"	"	272	R. E. Luepke, janitor	2.25
April 26	"	"	273	J. A. Muma, doorkeeper	2.25
April 26	"	"	274	Nellie Easton, clerk	4.13
May 24	"	"	275	Clerical force and Misc. Exp. in office for year	35.70
May 26	"	"	276	J. B. Edmundson, Exp. Principals Meeting	2.65
Oct. 22	"	"	277	E. E. Calkins, postage	6.16
Oct. 24	"	"	278	E. E. Calkins, postage	7.00
Oct. 27	"	"	279	American Express Co., delivery	8.85
Dec. 28	"	"	280	Roger Thomas, delivery	1.00
Dec. 30	"	"	281	Ann Arbor Press, printing	274.13
Dec. 30	"	"	282	H. G. Prettyman, postage	2.00

Total disbursements	$780.51
Total receipts	838.20
Balance, March 7	57.69
Bal. in Sav. Dept., Dec. 1, 1913	24.09
Bal. in Commercial Dept. March 7, 1914	$ 33.60

Report of Auditing Committee.

We, the undersigned, have examined the Financial Report of the Secretary-Treasurer of the Michigan Schoolmasters' Club, and find the same to be correct.

O. V. Adams,
Gertrude T. Breed,
Auditing Committee.

Report of Nominating Committee.

Officers for the year 1914-1915.

President—D. B. Waldo, Western Normal School.

Vice-President—Clara J. Allison, Owosso.

Secretary-Treasurer—Louis P. Jocelyn, Ann Arbor.

Classical Conference—Chairman, Benj. L. D'Ooge, Normal College; Vice-Chairman, J. G. Winter, University; Secretary, Anna S. Jones, Grand Rapids; Member of Executive Committee, Florence M. Barnard, Saginaw.

Modern Language Conference—Chairman, J. R. Effinger, University; Secretary, Emilie A. Flinterman, Detroit.

English Conference—Chairman, W. R. Stocking, Jr., Detroit; Secretary, Edith W. Shaw, Ann Arbor.

History Conference—Chairman, Mildred Hinsdale, Grand Rapids; Secretary, Bessie L. Priddy, Adrian.

Physics and Chemistry Conference—Chairman, D. L. Rich, University; Vice-Chairman, J. W. Matthews, Detroit Western; Secretary, B. W. Peet, Normal College.

Mathematical Conference—Chairman, L. C. Karpinski, University; Secretary, E. F. Gee, Detroit Central.

Biological Conference—Chairman, LeRoy H. Harvey, Western Normal; Secretary, Helen B. King.

Commercial Conference—Chairman, C. B. Bowerman, Detroit.

Physiography Conference—Chairman, E. C. Case, University; Secretary, Helen M. Martin.

Drawing Conference—Chairman, H. M. Kurtzworth, Muskegon; Secretary, Charlotte W. Calkins, Grand Rapids.

Manual Training Conference—Chairman, J. H. Trybon, Detroit; Secretary, R. F. Kepler, Detroit Cass.

Educational Psychology—Chairman, C. S. Berry, University; Secretary, H. C. Lott, Normal College.

Principals' Association—Chairman, W. M. Aiken, Ann Arbor; Secretary, D. G. Clancy, Hillsdale.

PROGRAM OF GENERAL SESSIONS

(Admission to all meetings of the Club by badge.)

Wednesday Afternoon, April 1

4:15 o'clock

BARBOUR GYMNASIUM

1. Young Ladies' Classes in Demonstration of Gymnastics.
2. Games.

Wednesday Evening, April 1

8:00 o'clock

HILL AUDITORIUM

Chairman—Professor W. W. Florer, University.

Celebration of Bismark's Anniversary.

(Compliments of the German Societies of Ann Arbor and of the University.)

1. Organ Selections,
   Frank Taber, University School of Music.
2. German Songs, University Quartette.
3. Ossian, Harmonie Männerchoir, Ann Arbor.
4. Address of Welcome,
   President H. B. Hutchins, University.
5. Erlkönig,
   William Howland, University School of Music.
   Accompaniment by Minnie Davis Sherrill, Detroit.
6. Address: The Economic Development of Germany Since 1870,
   Consul General Alfred Geissler, Chicago, Ill.
7. Am Rhein, Mrs. George A. Hastreiter, Ann Arbor.
8. Group of Songs, Harmonie Männerchoir.
9. America, Audience.

(Free reserved seats for club members wearing their badges. Go to door V and take a seat in section V.)

Wednesday Evening, April 1

7:00 o'clock

ROOM B-8, HIGH SCHOOL

Meeting of the of the Association of High School Principals.

Chairman—Principal E. E. Gallup, Adrian.

Secretary—

1. An Informal Discussion of the Administrative Work of High Schools.
2. Business meeting.

Thursday Morning, April 2

(Admission by badge)

10:00 o'clock

UNIVERSITY HALL

President—Superintendent J. M. Frost, Muskegon.
Secretary—Mr. L. P. Jocelyn, Ann Arbor.

1. Appointment of Committees.
2. The University in Its Relation to Public Utilities,
   Professor Mortimer E. Cooley, Dean of the Department of Engineering, University of Michigan.
3. Commercial Education and Public School Ideals,
   Honorable Woodbridge N. Ferris, Governor of the State of Michigan.
4. The School of Commerce and University Ideals,
   Professor Herbert J. Davenport, Head of Department of Political Economy, University of Missouri.

Thursday and Friday, April 2-3

NEWBERRY HALL

Women members of the club who wish to lunch together will be accommodated. No reservations necessary.

Thursday Afternoon, April 2

4:15 o'clock

HILL AUDITORIUM

University Glee and Mandolin Club Concert. Repertoire same as prepared for Pacific Coast trip. Admission, 15 cents.

Thursday Afternoon, April 2

5:00 o'clock

ROOM B-8, HIGH SCHOOL

Michigan Interscholastic Athletic Association.

Chairman—Principal W. A. Morse, Detroit.
Secretary—E. J. Shassberger, Lansing.

1. General Discussion of Interscholastic Athletics.
2. Business meeting.

4:00 o'clock

SARAH CASWELL ANGELL HALL

1. Junior Girls' Play. (Admission 25 cents.)
2. Stereopticon views of the plans of the new Women's Dormitory, the gift of a New York Alumnus.

6:00 o'clock

BARBOUR GYMNASIUM

3. Alumnæ Banquet.
   Miss Florence B. Barnard, Toastmistress.
   Speakers: President Emeritus James B. Angell, University; President Harry B. Hutchins, University; and others.

Thursday Evening, April 2

7:00-8:00 o'clock

THE MICHIGAN UNION BUILDING

Informal Réception of members of the Schoolmasters' Club and visiting speakers.

Chairman of the Reception Committee—Professor W. W. Florer.

(Note:—The Michigan Union will be pleased to serve meals to a limited number of teachers during the meeting.)

Thursday Evening

8:00 o'clock

HILL AUDITORIUM

Musical Program

Under the auspices of the University School of Music

Friday Morning, April 3

9:00 o'clock

Business of General Session

President—Superintendent J. M. Frost, Muskegon.

Secretary—Mr. L. P. Jocelyn, Ann Arbor.

(a) Reports of Officers.
(b) Reports of Committees.
(c) General Business.
(d) Remarks and Recommendations by the President.

9:30 o'clock

Literary Meeting of General Session

1. What the High School Stands for,
President Charles McKenny, State Normal College.
2. The Reconstructed High School,
Professor Calvin O. Davis, University of Michigan.
3. The Training of Secondary Teachers,
Superintendent Charles E. Chadsey, Detroit.

Friday Afternoon, April 3

4:00 o'clock

ROOM B-2, HIGH SCHOOL

Michigan State Federation of Teachers' Clubs

Chairman—Miss Euretta Bannister, Grand Rapids.

Secretary—Miss Margaret Strahn, Grand Rapids.

General Business meeting of the Presidents.

Friday Evening, April 3

8:00 o'clock

UPPER HALL, ALUMNI MEMORIAL BUILDING

1. The Results of the New Course of Study at Princeton,
Professor Andrew F. West, Dean of Graduate School, Princeton University.
2. Our Gospels and the Early Manuscripts,*
Professor H. A. Sanders, University of Michigan.

*Illustrated with the Stereopticon.

PROGRAM OF CONFERENCES

CLASSICAL CONFERENCE

(Admission by badge)

Chairman—Professor Campbell Bonner, University of Michigan.
Secretary—Miss Anna S. Jones, Grand Rapids.

Wednesday Afternoon, April 1
2:00 o'clock

ALUMNI MEMORIAL BUILDING, UPPER HALL

Presiding Officer—Professor Campbell Bonner, University.

1. Some Imperial Acclamations and Unexpected Parallels,
   Dr. Orma F. Butler, University of Michigan.
2. The Advantage of a Classification of Words by Concepts in Learning Languages,
   Professor Walter N. Halsey, University of Omaha.
3. The Technical Vocabulary of Robert of Chester's Latin Translation of the Algebra of Al-Khowarizmi,
   Professor L. C. Karpinski, University of Michigan.
4. The Associations of Cicero with his Villa at Tusculum,
   Mr. George R. Swain, University of Michigan.
5. Archæological Discoveries at Corfu,*
   Professor Martin L. D'Ooge, University of Michigan.
6. Examples of Pompeian Wall Decoration in the United States.*
   Professor Francis W. Kelsey, University of Michigan.

Thursday Afternoon, April 2
2:00 o'clock

ALUMNI MEMORIAL BUILDING, UPPER HALL

Presiding Officer—Professor Martin L. D'Ooge, University of Michigan.

7. High School Latin and the College Entrance Requirements,
   Professor B. L. D'Ooge, Michigan State Normal College.
   Discussion led by Professor H. A. Sanders, University of Michigan.
8. Light on the New Testament from Greek Life and Customs,
   Dr. F. E. Robbins, University of Michigan.
9. Why Students from Michigan High Schools who present Latin for Admission do not continue the Study of Latin in the University.
   Professor A. R. Crittenden, University of Michigan.

* Illustrated with the Stereopticon.

Discussion from the point of view of the University,
Professor A. G. Hall, and Professor T. E. Rankin, University of Michigan.
Discussion from the point of view of the Schools,
Superintendent W. G. Coburn, Battle Creek; Dr. F. O. Bates, Detroit Central High School.

4:00 o'clock.

10., Exhibits in the Basement of Memorial Hall:
A. Facsimiles of Manuscripts of the Bible. In charge of Professor H. A. Sanders.
B. Recent Publications in the Field of Classical Literature and Archæology. In charge of Professors Campbell Bonner and A. R. Crittenden.
C. Archæological Illustrative Material (Charts and Plates). In charge of Professor J. G. Winter and Dr. F. E. Robbins.
D. Inscriptions. In charge of Professor F. W. Kelsey.

Friday Afternoon, April 3

2:00 o'clock

ALUMNI MEMORIAL BUILDING, UPPER HALL

Presiding Officer—Professor John T. Ewing, Alma College.

11. The Socialization of the Classics,
Mr. Mason D. Gray, East High School, Rochester, New York; President of the Classical Section of the New York State Teachers' Association.
Discussion:
Miss Mary F. Farnsworth, Western High School, Detroit.
Miss Florence B. Barnard, Saginaw High School.
12. The Simultaneous Teaching of English Grammar and Beginning Latin in the Seventh and Eighth Grades.
Superintendent William A. Greeson, Grand Rapids.
13. The Language Problem of the Junior High School,
Professor A. S. Whitney, University of Michigan.

4:00 o'clock

14. Reception in the Alumni Association Room, Memorial Building, to which all friends of classical studies are invited.
Local Reception Committee—Chairman, Professor H. A. Sanders; Professors Kelsey and Winter.

8:00 o'clock

ALUMNI MEMORIAL BUILDING, UPPER HALL

Presiding Officer—Professor Francis W. Kelsey.

15. The Results of the New Course of Study at Princeton,
Professor Andrew F. West, Dean of the Graduate School, Princeton University.
16. Our Gospels and the Early Manuscripts,*
Professor H. A. Sanders, University of Michigan.

MODERN LANGUAGE CONFERENCE

(Admission by badge)

Chairman—Professor J. H. Bacon, Kalamazoo College.
Secretary—Miss Anna Barnard, Central Normal School.

Thursday Afternoon, April 2

2:00 o'clock

ROOM 203, UNIVERSITY HALL

Presiding Officer—Professor Max Winkler, University of Michigan.

1. The Supervised Study Period for Beginning German,
Miss Alice M. Wyman, Muskegon High School.
2. Some Experiments in Teaching First and Second Year German,
Professor Johannes Zedler, Albion College.
3. The Evolution of a Modern Language Teacher,
Miss Meta Schroeder, Battle Creek High School.
4. How Can We Make the Study of German More Vital?
Miss Augusta Meiser, Western High School, Detroit, Mich.

Friday Afternoon, April 3

2:00 o'clock

ROOM 203, UNIVERSITY HALL

Presiding Officer—Professor J. H. Bacon, Kalamazoo College.

5. Causes of Lack of Interest in Languages,
Miss Mary J. Ruthrauff, Owosso High School.
6. Can Thorough Preparation Result from Present Educational Tendencies?
Miss Pauline Harris, Pontiac High School.
7. The Early Dramas of Maeterlinck,
Professor M. Levi, University of Michigan.
8. Problems in Teaching Modern Languages,
Miss Daisy Caroline Olney, Kalamazoo High School.
9. Observations on the Present Status of Modern Language Instruction in Secondary Schools,
Superintendent T. J. Knapp, Highland Park, Mich.

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* Illustrated with the Stereopticon.

ENGLISH CONFERENCE

(Admission by badge)

Friday Afternoon, April 3

2:00 o'clock

AUDITORIUM, HIGH SCHOOL

Chairman—Professor John R. Brumm, University of Michigan.
Vice-Chairman—Mr. C. L. Spain, Detroit.
Secretary—Miss Edith W. Shaw, Ann Arbor.

1. What Not to Teach in the History of English Literature,
   Miss Caroline Britten, Jackson.
2. Four Sections of English Work, and Conference,
   Miss Mary Eaton, Grand Rapids.
3. Interpretative Readings and Literary Appreciation,
   Professor R. D. Hollister, University of Michigan.
4. Oral Composition,
   Mr. Robert Granville, Saginaw.
5. Shakespeare and the High School Student,
   Dr. Herbert S. Mallory, University of Michigan.
6. The Miracle and Morality Play as a Theme for High School Students,
   Miss Martha Clay, Grand Rapids.
7. Short Story Writing in the High School,
   Miss Edith Shaw, Ann Arbor.
8. A Question of Purpose in Teaching Literature in the High School,
   Professor John S. P. Tatlock, University of Michigan.
9. General Discussion of Papers.
10. Question Box: Conducted by Professor F. N. Scott, University of Michigan.

(To receive consideration questions must be handed to the Secretary or to Professor Scott before the opening of the Conference.)

HISTORY CONFERENCE

(Admission by badge)

Thursday Afternoon, April 2

2:00 o'clock

TAPPAN HALL

Chairman—Professor W. A. Frayer, University of Michigan.
Secretary—Mrs. Bessie L. Priddy, Adrian.

1. The Literary History of Secession,
   Professor Ulrich B. Phillips, University of Michigan.

2. One Hundred Years of Peace Between Great Britain and the United States,
   Superintendent E. C. Warriner, Saginaw.
3. The Use of the Stereopticon in the Teaching of French History,
   Professor T. Paul Hickey, Western Normal.
4. Round Table Topic: The Michigan Historical Commission and Its Work,
   Conducted by Dr. Geo. N. Fuller, Secretary of the Commission.

Friday Afternoon, April 3

2:00 o'clock

ROOM C-3, HIGH SCHOOL

5. Woman's Suffrage in New Jersey ,1790-1807,
   Professor Edward Raymond Turner, University of Michigan.
6. Economy in the Teaching of History,
   Miss Mildred Hinsdale, Grand Rapids.
7. The Study of State History,
   Professor Claude S. Larzelere, Central Normal.

CONFERENCE OF PHYSICS AND CHEMISTRY

(Admission by badge)

Thursday Afternoon, April 2

2:00 o'clock

PHYSICAL LABORATORY, WEST LECTURE ROOM

Chairman—Professor Francis S. Kedzie, Michigan Agr'l College.
Vice-Chairman—Professor Daniel L. Rich, University.
Secretary—Professor Clarence W. Greene, Albion College.

1. The Demand for Industrial Physicists,
   Dr. E. P. Hyde, National Electric Lamp Co., Cleveland, Ohio.
2. The Opportunity for Industrial Chemists,
   Professor Alfred H. White, University of Michigan.
3. Government Positions for Physicists and Chemists,
   Professor Karl E. Guthe, University of Michigan.
4. Business meeting.

Friday Afternoon, April 3

2:00 o'clock

5. Correlation of Chemistry and Domestic Science in both High School and College Instruction,
   Professor Agnes Hunt, Michigan Agricultural College.

6. Discussion lead by Professor Edith Blackman, State Normal College.
7. Correlation of Physics and Manual Training, and Physics with Domestic Science,
   Professor V. D. Hawkins, Cleveland, Ohio.
8. Discussion: Furnishing the Laboratory.
9. Selection and Purchase of Apparatus and Supplies,
   Principal E. N. Worth, Kalamazoo.
10. Care of the Apparatus and Plant,
    Mr. Albert Fitch, Allegan.
    Discussion: Mr. Dwight C. Carpenter, Grand Haven.
11. Annual Inventory and Accounting,
    Professor C. W. Chapman, Michigan Agr'l College.
12. General Discussion of a Reference Library List for High Schools in Chemistry and Physics.

MATHEMATICAL CONFERENCE

(Admission by badge)

Friday Afternoon, April 3

2:00 o'clock

TAPPAN HALL

Chairman—Mr. Albertus Darnell, Detroit.
Secretary—Professor W. H. Pearce, Normal College.

1. Graphical Methods Applied to the Solution of Algebraic Equations,
   Professor Theodore R. Running, University of Michigan.
2. Some Class Room Suggestions,
   Miss Katherine G. Hine, Detroit Central High School.
3. Some Recent Tendencies in the Teaching of Elementary Mathematics in the Light of History,
   Professor Elmer A. Lyman, State Normal College.
4. The Problem of Reducing the Number of Failures in Algebra,
   Mr. G. C. Bartoo, Jackson High School.
5. The Future of Geometry,
   Professor W. B. Ford, University of Michigan.
6. Discussion of Papers.

(Note: Exhibit of very old Math. Books, Library, East Corridor.)

BIOLOGICAL CONFERENCE

(Admission by badge)

Thursday Morning, April 2

9:30 o'clock

MUSEUM

Chairman—Le Roy H. Harvey, Western State Normal.
Secretary—Miss Helen B. King, Saginaw.

Symposium on "Adaptation"

1. The Zoological Point of View,
   Professor J. E. Reighard, University of Michigan.
2. The Botanical Point of View,
   Professor F. C. Newcombe, University of Michigan.
3. "Adaptation" and Its Relation to the Teaching of Biology,
   Professor C. E. Barr, Albion College.
4. Discussion: Opened by Professor W. E. Praeger, Kalamazoo College.

Biology Luncheon: 12:30 o'clock, Botanical Laboratory, price 25 cents. Reservations should be made early; address, J. B. Pollock, 922 Church St., Ann Arbor, Mich.

Thursday Afternoon, April 2

2:00 o'clock

MUSEUM

Symposium on Sex Instruction

1. Sex Instruction,
   Dr. W. S. Hall, Northwestern University.
2. Sex Instruction,
   Dr. V. C. Vaughn, University of Michigan.
3. Discussion: Opened by Professor Jessie Phelps, State Normal College, Ypsilanti.
4. Report on Biological Stations and Summer Schools,
   Miss Helen B. King, Saginaw.

Exhibit:—An exhibit of biological equipment and books has been secured by your program committee and will be found on display in the laboratory on the first floor of the Museum. It is hoped members of the conference and all interested will make an opportunity to study the same.

COMMERCIAL CONFERENCE

(Admission by badge)

Thursday Afternoon, April 2

2:00 o'clock

ROOM 348, ENGINEERING BUILDING

Chairman—Professor Walter H. Hamilton, University of Michigan.

1. Address: The Economics of Ostentation,
   Professor Herbert J. Davenport, University of Missouri.

Friday Afternoon, April 3

2:00 o'clock

ROOM 200, ECONOMICAL BUILDING

Chairman—Professor David Friday, University of Michigan.

2. The Teaching of Elementary Economics in the High School,
   Professor Frank U. Quillan, Knox College.

3. Recent Developments in Business Administration,
   Professor Edward D. Jones, University of Michigan.

4. University Requirements in Commercial Branches,
   (a) Commercial Law,
   Professor I. Leo Sharfman, University of Michigan.
   (b) Industrial History,
   Professor W. H. Hamilton, University of Michigan.
   (c) Bookkeeping and Accounting,
   Professor David Friday, University of Michigan.

PHYSIOGRAPHY CONFERENCE
(Admission by badge)

Friday Afternoon, April 3

2:00 o'clock

GEOLOGICAL LABORATORY, ECONOMICS BUILDING

Chairman—Professor Frank Leverett, University of Michigan.
Secretary—Mr. C. B. Bowerman, Detroit.

1. Field Work in the Baraboo District, Wisconsin,
Miss Bernice L. Haug, Detroit Central.
2. A Geography Course for the Ninth Grade,
Professor L. H. Wood, Western Normal.
3. Are We Making Physiography Practical?
Mr. J. W. Burns, Flint.
4. The Society Islands,
Miss Ethel W. B. Chase, Detroit Central.
5. Some Suggestions for Making Physiography Interesting and Practical,
Mr. W. L. Perkins, Dowagiac.
6. Teacher and Stereopticon,
Mr. R. C. Horine, Howell.

DRAWING CONFERENCE
(Admission by badge)

Friday Afternoon, April 3

1:30 o'clock

ROOM A, MEMORIAL HALL

Chairman—Professor Emil Lorch, University of Michigan.
Secretary—Miss Kate B. Conover, Detroit Central.

A. Business meeting.
B. Program arranged by Miss Alice Viola Guysi, Director of Drawing, Detroit.

1. Uniform Color Nomenclature,
Miss Ada L. Whitney, McMillan High School, Detroit.
2. Freehand Drawing and Design in Michigan State Normal Schools, Requirements and Opportunities,
Miss Bertha Goodison, State Normal College.
3. Normal Schools from the View Point of a Supervisor,
Mrs. K. C. Margah, Supervisor of Drawing, Highland Park, Detroit.

4. Freehand Drawing and Design in High Schools,
   (a) General Course,
   (b) Course Leading to University Credits,
   (c) Course Leading to Normal Entrance Credits for Students Intending to Become Teachers,
   (d) Applied Design,
   Miss Carol M. Lewerenz, Detroit Central.
5. Coöperation,
   M. Frank Cody, Vice-President State Board of Education and Assistant Superintendent, Detroit.

Exhibition of Drawing from the School of Education, University of Chicago, through the courtesy of Walter S. Sargent, Professor of Aesthetic and Industrial Education, University of Chicago.

MANUAL TRAINING CONFERENCE

(Admission by badge)

Friday Afternoon, April 3

2:00 o'clock

ROOM C-1, HIGH SCHOOL

Chairman—Mr. J. H. Trybom, Detroit.

General Subject—The Function of Manual Training in the High School.

1. From the View Point of the Engineering College,
   Dean M. E. Cooley, University of Michigan.
2. From the View Point of the Manufacturer,
   Mr. Ralph W. Davis, Cadillac Motor Car Co., Detroit.
3. From the View Point of the City Superintendent of Schools,
   Superintendent E. C. Warriner, Saginaw.

EDUCATIONAL PSYCHOLOGY CONFERENCE

Thursday Afternoon, April 2

2:00 o'clock

HIGH SCHOOL PHYSICS ROOM

Chairman—Professor George B. Randels, Alma College.

Secretary—Professor H. C. Lott, State Normal College.

1. Value of Psychological Tests in Determining Life-vocation,
   Professor C. S. Berry, University of Michigan.
2. Discussion,
   Principal Jesse B. Davis, Grand Rapids.
3. Practical Psychology Applied to Telephone Operators,
   Mr. R. C. Sackett, Michigan Telephone Co.
4. Educational Diagnosis,*
   Professor S. A. Courtis, Detroit.
5. Discussion,
   Professor N. W. Cameron, Western Normal.
6. General Discussion.

* Illustrated with the Stereopticon.

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JACKSON
Britton, Caroline E.
Edmonson, J. B.
Marsh, E. O.
Wilcox, Elizabeth L.

KALAMAZOO
Hartwell, S. O.
Worth, E. N.

KALAMAZOO COL.
Bailey, Mark
Praeger, W. E.
Williams, C. B.
Williams, Geo. A.

LINDEN
Burr, C. J.

MANCHESTER
Kirchhofer, Marie
McCallum, C. W.

MANISTIQUE
Edmonds, G. P.

MARINE CITY
Hazelton, R.

MARSHALL
McDiarmid, L. A.

MICH. AGRI. COL.
French, W. H.

MISHAWAKA, IND.
Kern, Kate

MONROE
Evangelista, Sister M.
Gilday, Selma
Highley, A. M.
Wagner, Martha

MT. PLEASANT
Teninga, Gertrude

MUSKEGON
Craig, J. A.
Frost, J. M.
Kurtzworth, H. M.

NILES
Allen, Hilah L.

NORMAL COLLEGE
Barbour, F. A.
D'Ooge, B. L.
Elliott, C. M.
Everett, J. P.
Ford, R. C.
Goddard, Mary A.
Gorton, F. R.
Harvey, N. A.
Laird, S. B.
Lyman, E. A.
Muir, Helen B.
Pearce, W. H.
Peat, B. W.
Strong, E. A.
Wilber, H. Z.

OAK PARK, ILL.
Lee, L. B.

OWOSSO
Allison, Clara J.
Longman, M. W.

OXFORD, OHIO
Bishop, Elizabeth L.
PLYMOUTH
Isbell, W. N.
PONTIAC
Dudley, S. M.
Jenner, G. L.
McCarroll, Sarah
Travis, Ora
PORT HURON
Anderson, Theo
Chapin, Allie B.
Crane, Mrs. S. A.
Davis, H. A.
Easton, A. J.
Fyan, Lila E.
Lewis, W. F.
Staley, Ethel
RIVER ROUGE
Jones, Winnie M.
McDonald, A.
Outwater, Olive
ROMEO
Muma, J. A.
ROSE CITY
Gould, Wm. E.
SAGINAW
King, Helen B.
Tanis, J. E.
Warner, W. W.
Warriner, E. C.
ST. CHARLES
Frostic, F. W.
ST. JOHNS
Daboll, Winifred C.
SUPERIOR, WIS.
Wade, C. G.
SWARTHMORE, PA.
Dennison, Walter
TOLEDO, O.
Kimball, Edith M.
TRAVERSE CITY
Tyler, L. L.
UNIVERSITY
Angell, J. B.
Beman, W. W.
Berry, C. S.
Bigelow, S. L.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Canfield, A. G.
Crittenden, A. R.
Cross, A. L.
Diekhoff, Tobias
Dow, E. W.
Effinger, J. R.
Field, Peter
Finney, B. A.
Florer, W. W.
Glover, J. W.
Guthe, K. E.
Hall, A. G.
Hauhart, Wm. F.
Hildner, J. A. C.
Hutchins, H. B.
Kelsey, F. W.
Lichty, D. M.
Lorch, Emil
Love, C. E.
Markley, J. L.
Meader, C. L.
Nelson, J. R.
Newcombe, F. C.
Pollock, J. B.
Rich, D. L.
Running, T. R.
Scott, F. N.
Scott, I. D.
Swain, Geo. R.
Tilley, M. P.
Trueblood, T. C.
Wenley, R. M.
Williams, N. H.
Winkler, Max
Winter, J. G.
Ziwet, Alexander
VICKSBURG
Smith, P. H.
WESTERN NORMAL
Burnham, Ernest
Harvey, L. H.
Hickey, T. P.
Parsons, Maude
Waldo, D. B.
YPSILANTI
Arbaugh, W. B.
Hardy, Carrie A.
Jones, L. H.
Ross, DeForest

List of Members for 1914

ADRIAN
Cantrick, G. T.
Gallup, E. E.
Hunter, R. B.
Michens, C. W.
Priddy, Bessie L.
Reed, E. J.
Schaible, Ida M.
Thomas, Edith
ALBION
Griffy, C. H.
ALBION COLLEGE
Barr, C. E.
Demorest, F. C.
Fall, Delos
Goodrich, F. S.
Greene, C. W.
Sleight, E. Roscoe
Zedler, John
ALLEGAN
Fitch, Albert
ALMA
Ellsworth, F. E.
Potter, Sena
ALMA COLLEGE
Randels, G. B.
ALPENA
Churm, P. L.
Morell, L. G.
ANN ARBOR
Abell, E. L.
Adams, O. V.
Aiken, W. M.
Bennett, Ella M.
Breed Gertrude
Brightman, Hazel
Brown, Jessie
Chute, H. N.
Ehle, C. E.
Eich, Louis
Essery, E. E.
Goodell, F. Maude
Gundert, Emily
Jocelyn, L. P.
Lusby, Lulu V.
McAllister, H. A.
McCain, A. B.
Magdalene, Sister M.
O'Brien, Sarah
Palmer, Mrs. J. V.
Porter, Alice
Purtell, Catherine
Ray, Anna M.
Rennie, Florence M.
Robison, Cora
Rothman, Alice
Shaw, Edith W.
Slauson, H. M.
Spaulding, A. E.
Springer, D. W.
Sturgis, Martha
Sudworth, Gertrude
Tatlock, Orrett
Tinkham, Lona C.
Walsh, May
Weinmann, Louise
West, Jeannette S.
Wines, L. D.
BANGOR
Richmond, J. P.
BATTLE CREEK
Coburn, W. G.

Krell, Carrie
Mann Jessie
Marshall, Anna E.
Martin, Helen M.
Schroeder, Meta
BAY CITY
Basler, C. D.
Beese, Julia H.
Campbell, Florence
Day, Agnes A.
Eckert, A. C.
Gates, Mrs. E. L.
German, W. L.
Grinnell, E. M.
Hughes, H. D.
Hunker, Emma G.
Langdon, C. S.
Liskow, Julia
MacGregor, Helen
McCombs, Ethel
McKinney, Mary
McVittie, Alex
Merrill, Frances H.
Miller, B. E.
Morris, W. W.
Olson, Florence
Paxton, R. D.
Rankin, H. D.
Rich, L. H.
Royal, H. D.
Schroeder, Matilda
Sharpe, E. M.
Sites, Venette M.
Skinner, G. H.
Sloan, N. B.
Taylor, Harriet L.
Ten Eyck, H. E.
Wells, Berta A.
BIRMINGHAM
Stauch, Lillian
BENTON HARBOR
Wright, W. R.
BEAVERTON
Torrey, Alice
BIG RAPIDS
Head, LeRoy S.
BLISSFIELD
Sawall, F. A.
BOYNE CITY
Butler, L. A.
BRIDGE CITY
Northon, J. T.
BURR OAK
Barlow, Mildred
CADILLAC
Porter, J. E.
CASS CITY
Kennedy, J. E.
CENTRAL NORMAL
Grawn, C. T.
CHARLOTTE
Carrick, C. H.
Cole, Conscello
Howard, Lillian E.
Van Kleek, Mabel
CHELSEA
Hendry, Frank
CHESANING
Ellsworth, B. B.
CHICAGO, ILL.
Boyer, C. J.
Brooker, A. G.
Elson, F. W.
Johnson, H. M.
Lobaugh, E. D.
Miner, R. S.
Woodhams, J. W.
CHILLICOTHE, O.
Hamilton, F. G.
CLEVELAND, O.
Hawkins, V. D.
CLEARY'S BUS COL.
Cleary, P. R.
Wainwright, Mrs. K.
COLDWATER
Bechtel, G. A.
Randolph, Mrs. H. E.
Severnance, Ruby L.
Sismon, Elsie
Stone, C. A. R.
DEARBORN
Salisbury, H. A.
DENTON
Smith, Ross H.
DETROIT
Arbury, F. W.
Chadsey, C. E.
Cody, Frank
Eagleson, Stuart
Ellis, Wm. A.
Fleming, Jennie M.
Fraser, H. F.
Frederick, O. G.
Gunn, E. J.
Guysi, Alice V.
Guysi, Jeannette
Hayner, Elizabeth
Hull, L. C.
Lightbody, W. M.
Linn, Flora R.
Logan, Jean W.
Mandeville, J. M.
McBee, A. L.
McSweeney, Catherine
Miller, J. R.
Morse, J. A.
Mullen, Mrs. S. W.
Picken, C. A.
Shaw, E. R.
Spain, C. L.
Spicer, C. E.
Thomas, J. F.
Trybon, J. H.
Tull, A. F.
Wolverton, Annie W.
Youngquist, A.
DETROIT CASS TEC.
Allen, E. G.
Brooker, F. S.
Comfort, B. F.
Cooke, C. S.
Cooper, L. G.
Glass, W. N.
Holtsclaw, J. L.
Howell, J. C.
Jones, Geo. W.
Keal, H. M.
Kepler, F. R.
Kibby, Chas. G.
Lake, J. G.
Maxwell, G. W.
Murchey, Karl E.
Pagelson, Henriette
Phelps, Nancy S.
Phillips, Nellie G.
Skeels, A. D.
DETROIT CENTRAL
Ashleman, Lorley A.
Bartlett, A. E.
Bates, F. O.
Bishop, Mrs. H. A.
Bishop, Helen L.
Blanchard, C. W.
Brown, J. S.
Chase, Ethel W. B.
Conover, L. Lenore
Cook, Frances C.
Copeland, Cornelia A.
Darnell, Albertus
Dillon, Florence G.
Fell, D. J.
Fishbaine, S. S.
Flintermann, Emilie A.
Frost, H. H.
Gee, E. F.
Gerls, Marian S.
Goldman, Miriam D.
Graham, A. A.
Hadley, May
Haug, Bernice L.
Hard, Helen
Harper Susan
Hawley, Elizabeth W.
Hine, Katherine G.
Hull, Isabella H.
Irwin, F. C.
Kanouse, Marion
Lennon, Mary E.
Levin, S. M.
Lewerenz, Carol M.
Lowry, Florella R.
Mackenzie, David

Malcomson, Rachel
Mutschel, Matilda
Plee, Nellie O.
Power, Mary F.
Rivett, B. J.
Roby, Anne M.
Sargeant, Charlotte H.
Sargent, W. A.
Schwartz, Elsie M.
Stocking, W. R., Jr.
Thompson, E. C.
Thompson, Margaret E.
Torr, Mary D.
Watt, Isabella R.
Wilson, J. A.

DETROIT EASTERN
Bishop, J. R.
Coyle, Harriette
Fleischer, Louise
Fuhry, E. G.
Gartner, Katherine M.
Gordon, A. L.
Grant, J. F.
Harvey, Caroline C.
Hauser, Alice J.
Jackson, Virginia M.
Klein, Adele
Leuchtweis, Otelia
McAdam, Grace P.
Merriam, A. R.
Moehlmann, Nellie D.
O'Dea, Harriet
Pettee, Edith E.
Putnam, R. R.
Struble, R. H.
Vernor, Edna L.
Wuesthoff, E. Jr.

DETROIT, GEORGE JR.
Austin, Olive
Bright, Alma A.
Bright, Cora E.
Cox, Charles C.
Ladd, Bessie F.
Larden, John
Mote, E. L.

DETROIT, HIGGINS
Roper, Gertrude

DETROIT, THE LIGGETT.
Courtis, S. A.
Liggett, Miss J. M.

DET. McMILLAN
Hudson, Maud E.
King, Blanche L.
Kysor, Dania
Murdock, G. W.
Wagner, T. E.
Whitney, Ada L.

DETROIT U. S.
Bliss, F. L.
Milner, Florence

DETROIT NORTHWESTERN
Alley, Sadie M.
Chapman, Ivan E.
Corns, J. H.
Jones, A. F.
Miller, E. L.
Miner, Mary L.
Orth, Louise
Parmerlee, E. Grace
Wentworth, Wm. H.
Whitney, Edward
Wilson, Jean W.

DETROIT WESTERN
Arms, Nellie
Bancroft, Nellie E.
Barney, Bertha C.
Barney, Blanche K.
Brown, Ida L.
Brown, Margaret C.
Coughlan, Nina
Elliott, Lucy
Farnsworth, Mary F.
Frutig, Marie L.
Hempsted, Johanna K.
Hendershott, Pearl
Hickok, D. W.
Holmes, E. L.
Holmes, F. H.
Hunt, Agnes
Kerns, Martha
Ludke, C. W.
Marquardt, Helena
Matthews, J. W.
McMillan, D. W.
Meiser, Augusta B.
Merrill, J. W.
Morse, W. A.
Parker, Flora E.
Pitts, Dora
Seiffert, Berthold
Seiffert, Elsa
Sundstrom, Elizabeth
Towar, Ethel L.
Waples, Marcia
Warner, W. E.
Weir, W. W.
Wilkinson, A. O.
Willoughby, Ruth A.
Wiltsie, Katherine D.
Woodward, Miss M. C.

DOWAGIAC
Luellemann, Irma
McCormick, P. F.
Perkins, W. L.

EAST TAWAS
Mitchell, S. C.

FENTON
Cody, E. E.
Lyons, D. F.

FERRIS INSTITUTE
Ferris, W. N.

FLINT
Ballard, Edna L.
Cody, A. N.
Gold, Mary E. S.
Nutt, H. D.
Parmelee, L. S.
Puffer, W. J.
Wellwood, J. E.
Wightman, E. R.
Wright, L. L.

GOSHEN, IND.
Rosenthal, B. F.

GRAND HAVEN
Carpenter, D. C.
Hoekje, J. C.

GREENVILLE
Straight, Chester.

GRAND RAPIDS
Calkins, Charlotte W.
Carpenter, C. M.
Clay, Martha
Davis, Jesse B.
Eaton, E. J.
Eaton, Mary N.
Ellis Grace F.
Greeson, W. A.
Holt, Alicent
Hinsdale, Mildred
Hulst, Cornelia S.
Jones, Anna S.
McMillan, D. G.
Miller, Anna W.
Stearns, Frances L.
Stetson, P. C.
Upton, T. D.

GROSSE ISLE
Runciman, C. H.

HARBOR SPRINGS
Gibb, H. L.
Kress, Margaret

HART
Dondineau, Arthur

HASTINGS
Hinckley, C. G.
Wallace, W. T.

HIGHLAND PARK
Armitage, Clarabel
Bacon, Josephine
Down, E. F.
Fletcher, Rachel
Knapp, T. J.
Leonard, G. O.
Locke, J. R.
Margah, Mrs. Katherine C.
Mumford, E. H. E.

Potter, E. G.
Prakken, Wm.
Rogers, Esca
Scutt, Amy G.
Streator, Emma
Treadwell, Lillian
Van Loon, G. E.
Yorks, Anna M.
HILLSDALE
Clancy, D. G.
Gier, S. J.
HILLSDALE COL.
Congdon, Harriet R.
Larrabee, H. B.
Mauck, J. W.
HOLLAND
Gilbert, R. H.
HOMER
Flint, A. J.
HOPE COLLEGE
Nykirk, J. B.
HOWELL
McDowell, Prudence
Wells, Eunice
HUDSON
Poor, C. L.
Yokom, M. C.
IONIA
Barlow, Edna
Forsythe, L. L.
Jenks, Caroline
McGuinness, J. P.
JACKSON
Bartoo, G. C.
Britten, Caroline E.
Coy, Jennie
Davis, Ruth
Edmonson, J. B.
Hallock, Ella
Holland, C. F.
Kempf, Flora
Luidens, J. E.
Marsh, E. O.
McCulloch, G. L.
Miller, Laura
Parker, P. F.
Paschke, L. A.
Sherman, Elizabeth L.
Skillen, Elizabeth
Trumble, O. S.
Watkins, E. E.
Wilcox, Elizabeth L.
KALAMAZOO
Hartwell, S. O.
Loomis, F. H.
Norcross, S. B.
Olney, Daisy C.
Worth, E. N.
KALAMAZOO COL.
Bacon, J. H.
Bailey, Mark
Hussey, Bertha
Praeger, W. E.
Williams, C. B.
Williams, G. A.
LANSING
Ammerman, Laura B.
Bishop, W. T.
Fuller, G. N.
Keeler, Fred L.
Lyon, I. E.
Munson, J. M.
LAPEER
Wilson, U. S.
LAWTON
Murphy, C. R.
LINDEN
Burr, C. J.
MANCELONA
Alfred, J.
McKim, Ora
Smith, R. H.
MANCHESTER
Kirchhofer, Marie
McCallum, C. W.
MANISTIQUE
Edmonds, G. P.
MARION
Chase, Alberta
MARINE CITY
Hazelton, R.
MARSHALL
McDiarmid, L. A.
Smith, N. R.
MT. PLEASANT
Swigart, R. G.
Teninga, Gertrude
MISHAWAKA, IND.
Kern, Kate
MICH. AGR. COL.
Bessey, Ernst A.
French, W. H.
Grover, E. L.
Kedzie, F. S.
Plant, L. C.
MONTGOMERY
Kempton, R. M.
MT. CLEMENS
Eddy, Leo L.
MONROE
Cecile, Sister M.
Evangelista, Sister M.
Gilday, Selma
Highley, A. M.
Theodosia, Sister M.
Wagner, Martha
MUSKEGON
Anderson, Blanche
Bennett, J. G.
Craig, J. A.
Frost, J. M.
Kurtzworth, H. M.
Wyman, Alice
NEWBERRY
Fuller, H. H.
NEWAYGO
Cross, Mabel.
NILES
Allen, Hilah L.
Travis, M. B.
NORMAL COLLEGE
Barbour, F. A.
Blackman, Edith
Childs, H. Ethel
D'Ooge, B. L.
Elliott, C. M.
Erickson, A. G.
Everett, J. P.
Fleischer, Ida
Ford, R. C.
French, Mrs. M. H.
Goddard, Mary A.
Goodison, Bertha
Gorton, F. R.
Harvey, N. A.
Haughton, Grace
Hoyt, C. O.
Laird, S. B.
Lott, H. C.
Lyman, E. A.
McKaye, F. B.
McKenny, Chas. C.
Muir, Helen B.
Norris, O. O.
Pearce, W. H.
Peet, B. W.
Pray, Carl E.
Sherzer, W. H.
Smith, Bertram G.
Strafer, Elinor
Strong, E. A.
Walton, Miss G. M.
Wilber, H. Z.
NORTHERN NOMAL
Magers, S. D.
Spooner, C. C.
NORTHVILLE
Wheaton, F. W.
OAK PARK, ILL.
Lee, L. B.
OTSEGO
Fast, L. W.
ORTONVILLE
White, W. D.
OVID
Smith, F. C.
OWOSSO
Allison, Clara J.
Cleary, Marjory
Longman, M. W.
Ruthrauff, Mary

OXFORD
DeWitt, A. D.
OXFORD, OHIO
Bishop, Elizabeth L.
PLAINWELL
Updike, Audrey
PLYMOUTH
Isbell, W. N.
Lappeus, Anna
PONTIAC
Dudley, S. M.
Harris, Pauline
Jenner, G. L.
McCarroll, Sarah
May, Mrs. L. P.
Travis, O.
PORTLAND
Nielsen, N. C.
Sanford, P. C.
PORT HURON
Anderson, Theo
Chapin, Allie B.
Crane, Mrs. S. A.
Davis, H. A.
Easton, A. J.
Fyan, Lila E.
Lewis, W. F.
Staley, Ethel
RICHMOND
Johnson, W. F.
Lee, W. L.
Maxwell, Helen
Roese, Marie
Weeks, Nina A.
RIVER ROUGE
Eastman, Jennie L.
Gregg, Nellie
Hall, C. F.
Jones, Winnie M.
McDonald, A.
Outwater, Olive
Shrimp, H. R.
ROMEO
Muma, J. A.
Thompson, O. D.
ROSE CITY
Gould, Wm. E.
ROYAL OAK
Lederle, E. J.
Scherzer, Josephine
SAGINAW
Ascher, Margaret M.
Atkinson, F. H.
Baker, M. B.
Barnard, Florence B.
Blanchard, Bertha
Burnham, Fannie A.
Carpenter, Beulah
Carr, Anna M.
Coney, Charlotte
Graebner, Elizabeth
Granville, Robt.
Hach, C. A.
Keating, Florence A.
King, Helen B.
Langdon, J. W.
Lange, H. C.
Loveland, Cora
Lutes, Doris
Morgan, Lillian B.
Nash, M. Estelle
O'Brien, Gertrude
Sessions, Jessie M.
Tanis, J. E.
Warner, W. W.
Warriner, E. C.
Weber, Mary A.
Webster, May
Whitney, Beulah G.
SANDUSKY, OHIO
Mosely, E. L.
SANFORD
Williamson, Zella
ST. CHARLES
Frostic, F. W.
ST. JOHNS
Buck, F. P.
Daboll, Winifred C.
McIlhenny, Mary E.
Waite, Roy E.
ST. LOUIS,
Dawson, C. D.
SOUTH BEND, IND.
Campbell, Katherine
SOUTH HAVEN
Doud, W. H.
McAlpine, D. P.
SWARTHMORE, PA.
Dennison, Walter
SUPERIOR, WIS.
Wade, C. G.
TECUMSEH
Exelby, Francis
TOLEDO, OHIO
Kimball, Edith M.
TRAVERSE CITY
Curtis, G. H.
Tyler, L. L.
TROY
Churchill, F. M.
URBANA, ILL.
Goldthwaite, Nellie
UNION CITY
Brown, Grace
UNIVERSITY
Angell, J. B.
Beman, W. W.
Berry, C. S.
Bigelow, S. L.
Bird, J. P.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Brumm, J. R.
Butler, Miss O. F.
Canfield, A. G.
Crittenden, A. R.
Cross, A. L.
Diekhoff, Tobias
D'Ooge, M. L.
Dow, E. W.
Effinger, J. R.
Field, Peter
Finney, B. A.
Florer, W. W.
Ford, W. B.
Frayer, W. A.
Glover, J. W.
Guthe, K. E.
Hall, A. G.
Hauhart, W. F.
Hildebrandt, T. H.
Hildner, J. A. C.
Hollister, R. D. T.
Hutchins, H. B.
Jordan, Myra B.
Karpinski, L. C.
Kauffman, C. H.
Kelsey, F. W.
Kraus, E. H.
LaRue, G. R.
Leverett, Frank
Lichty, D. M.
Lindsay, Geo. A.
Lorch, Emil
Love, C. E.
Markley, J. L.
Meader, C. L.
Nelson, J. R.
Newcombe, F. C.
Pollock, J. B.
Rathke, W. R.
Rich, D. L.
Robbins, F. E.
Running, T. R.
Sanders, H. A.
Scholl, J. W.
Scott, F. N.
Scott, I. D.
Sharfman, I. Leo
Sleator, W. W.
Swain, Geo. R.
Tatlock, J. S. P.
Tilley, M. P.
Trueblood, T. C.
Wahr, F. B.
Wenley, R. M.
Whitney, A. S.
Williams, N. H.
Winkler, Max
Winter, J. G.
Ziwet, Alex.
UTICA
Sprinkle, R. W.

VICKSBURG
Smith, P. H.
WAYNE
Raycraft, R. E.
WESTERN NORMAL
Burnham, Ernest
Cameron, N. W.
Fox, J. E.
Harvey, L. H.
Hickey, T. P.
Marsh, Alice L.
Parsons, Maude
Waldo, D. B.
Wood, L. H.
WILLIAMSTON
Hornberger, J. J.
WYANDOTTE
Daley, H. C.
Pike, C. F.
YPSILANTI
Arbaugh, W. B.
Beadle, W. B.
Cooper, Elsie E.
DeVoe, Una
Hardy, Carrie A.
Hull, O. C.
Jones, L. H.
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JOURNAL

OF THE

Michigan Schoolmasters' Club

FIFTIETH MEETING

Held in Ann Arbor, March 31, April 1, 2, 1915

ANN ARBOR, MICHIGAN

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Michigan Schoolmasters' Club

PROCEEDINGS OF THE FIFTIETH MEETING, HELD AT ANN ARBOR, MARCH 31, APRIL 1, 2, 1915.

EDITED BY THE SECRETARY.

GENERAL MEETING

The fiftieth meeting of the Michigan Schoolmasters' Club began on Wednesday, March 31, with meetings of the Classical Conference and of the Principals' Association, and a Demonstration of Gymnastic Games and Dances by the young ladies of the University, in Barbour Gymnasium.

The General Sessions of the Club were held on Thursday and Friday mornings. Thursday morning was given over to the teachers of Physiography. Professor Mark Jefferson spoke upon "The American City," Professor R. D. Salisbury, of the University of Chicago, upon "Porto Rico," and Professor D. W. Johnson, of Columbia University, upon "The Physiographic Features of Western Europe as a Factor in the War."

On Friday morning the general subject for consideration was "Present Day Education." Professor Lotus Coffman, University of Illinois, spoke upon the topic "Some Present Day Educational Fallacies"; Professor Henry Suzzalo, of Columbia University, upon "The Social Interpretation of a Liberal Education."

On Thursday afternoon the University School of Music gave a musical program in Hill Auditorium which was of high order and greatly appreciated by a large audience.

Informal receptions for the members of the club were held at different places and helped to make the meeting a very enjoyable one.

A number of fine exhibits shown during the week were appreciated and highly spoken of by members of the club.

Special meetings of the Principals' Association, Federation of Teachers' Clubs, and of the Michigan Interscholastic Athletic Association, were held during the week.

The club has twelve Conferences. Eight of these held meetings on Thursday, and eleven on Friday.

The complete program of the meeting is printed near the end of the proceedings. Notice the fine list of members at the end of the Journal and also the schools that are alive to the educational interests of the State.

The Secretary cannot publish all of the one hundred and more papers, but will publish the papers of general interest and one or two from each of the twelve conferences if turned in by the respective chairmen by the first week in May.

CLASSICAL CONFERENCE

OXFORD'S ESTIMATE OF THE CLASSICS.

PROFESSOR M. J. HOFFMAN. HOPE COLLEGE.

This paper is not to be a panagyric on the classics. The recent battle that was waged in THE OUTLOOK did all that and more. The classics will stand or fall on their own merits. When they no longer have anything to contribute towards the proper training of the young men and women in our colleges and universities, they will die a natural death. But that day is still far distant. Nor is it my purpose to discuss the place the classics hold in the educational program, if I may call it such, of that time honored university. That would be an easy matter, as it cannot be denied that Oxford's history is a history of classical education. Yet in passing let me say that those of you who have the idea that nothing but Latin, Greek and Sanskrit are taught there, are very much mistaken. Everyone who speaks of Oxford falls an easy victim to the temptation to expatiate ad nauseam about her venerable halls and towers, her Norman gateways and Gothic arches. One is inclined to think of Oxford as a place where the halo of antiquity lingers lovingly around everything one meets, where pale faced dons, the majority in clerical garb, quote reams of Latin, and students are expected to express their deepest sentiments in Greek. That is not true. While not aspiring to specialization, Oxford is intensely modern. Her schools of history, jurisprudence, English literature, modern languages and theology, and even her scientific departments are well organized and rapidly coming up to date.

But that is not saying that the classics have fallen from their high estate, and that only the momentum acquired in ages long since forgotten keep them moving to-day. Whether Oxford is justified in emphasizing the classics the way she does, does not concern this paper. I wish to discuss Oxford's estimate of the classics from the point of view of the practical, if I may call it so, i. e. Oxford's regard for the classics in the way they are taught, and the real knowledge by way of content which they contribute.

While one is justified in seeking knowledge for its own sake, I am inclined to think that at Oxford the aim is not solely classics for classics sake. On the contrary much of the popularity of the classics there is due to the fact that they are taught in their relation to the world movements of thought and life. So this paper deals with Oxford's estimate as expressed in method and aim, not as concerned with any abstract notion about the comparative value of a classical or non-classical training.

The average English undergraduate, especially if he has taken the classical course at the English public schools, has had a veryexcellent training not only in the elementary principles of the language but in classical literature as well. Prose composition, the writing of essays in both Latin and Greek, frequent attempts at writing Latin verse, together with the reading of the classics themselves, have given him a far firmer grasp on Latin and Greek than students of equal age in our country. The entrance examination, called responsions, for the English school boy is practically the same as that set for the Rhodes examination.

Before a student who has just entered the University is entitled to read for his honor degree, he must, unless he be granted Senior Standing, which not 15% of the entering students receive, take a preliminary examination, which is called either Pass Moderations, or Law or Science preliminary, the latter two being taken when the student expects to take his honor degree in Law or the Sciences respectively, the former for nearly all the other schools, e. g. history, literature, Literæ Humaniores and theology. The latter examination consists of specified Latin and Greek works, Latin prose and Logic. In preparation for the Pass Moderation examination the classes meet in the various colleges very much as they do in our own. Lectures are only incidental. In translation I noticed that utmost freedom as regards construction was allowed, but a rigid emphasis laid on clearness of expression and felicity in choice of words. The emphasis laid on content seemed at first all out of proportion to the rest. For example, in reading Cicero's second Philippic I was compelled to make a thorough review of the history of the Roman Republic. An explanation of every possible allusion was demanded. In other words Latin was related to the historical period in hand. The identical thing was true for the Agricola and Germania of Tacitus. In fact so insistent is the demand on the content of the work, that small hand-books dealing exclusively with subject-matter have been published to enable the student, who has a good verbal memory, to get thru the examination with the least possible effort. For example in the hand-book dealing with subject matter of the Agricola and Germania, 15 pages are devoted to Agricola, disposed of in this way: two pages to a very brief account of each of the Roman emperors mentioned in the Agricola; one page to a summary of purposes of the Agricola; three pages to Dominitian and the victims of Domitian mentioned by Tacitus; two pages to the governors of Britain in their Chronological order; three pages to Agricola, his family, official career, gov-

ernor of Britian, his reforms there, and a summary of his character, one page to the natives of Britian, and two pages to a summary of the speeches in the Agricola. The insistence on subject matter on the part of the examiners has occasioned these hand books. Their demoralizing effect is patent.

As for Greek, in which the Meno and the Apology were required, the same method was pursued, but along different lines, the emphasis naturally being laid on the didactic and argumentative nature of the works. To know the general course of the argument is not sufficient, as in the examination one is held responsible for specific details. The same applies to the text, for at the close of each set of questions are found a half a dozen isolated sentences taken from the body of the work, upon which one is supposed to comment as regards context.

However, the one factor which more than another decides the outcome of an examination, is Latin prose composition. In fact it is generally conceded that in the Rhodes Examination if a student does an excellent Latin Prose and fails utterly in Mathematics, he is quite sure of passing. The students at Oxford themselves are usually more worried about Latin Prose than anything else. A mistake in prose in Oxford parlance is called a "howler", and it is almost a proverb in some of the colleges that five howlers plough any man. One's tutor pays especial attention to this part of the work, especially in the case of Americans, naturally for very good reasons. The English school boy, who has had a classical education has written more essays and poems in Latin than the average American has sentences. My tutor's recurring phrase was, "I fancy Cicero would have expressed this in this way." He was generally right, at least I was not in a position to contradict him.

Passing now from the preliminary to the regular honor school work, I must limit myself to the Literae Humaniores school, which, as you know, is commonly called "Greats." It is unquestionably still to-day *the* school in Oxford, there being more greats tutors and greats dons lecturing than in any two other schools combined. By schools I naturally mean the different departments of the University, as we know them in America. Now the prevailing idea is that the greats course is concerned wholly with the classics. That is not the whole truth. For the B. A. degree in the school of Literae Humaniores three things are required:

1. Greek and Latin languages.
2. The History of ancient Greece and Rome, with a detailed and thorough study of some special period in the history of each country, and, notice, this to be studied as far as possible in the original authors.
3. Logis and the outlines of moral and political philosophy, including the outlines of political economy.

It must be noticed that Latin and Greek are not regarded as something

independent, but as directly related to the whole course. For example should a student select the period between 478 and 322 B. C. in Grecian history for special and detailed study, he would be especially examined in Thucydides, Xenophon's Hellenics, book XVI of Diodorus, the first three Philippics of Demosthenes, the Panegyricus, Philippus, the Areopagiticus and De Pace of Isocrates, and the Anabasis of Arrian. In Roman History the student has the choice of one of three special periods:

1. From the first Punic war to the battle of Actium.
2. From the end of the third Punic war to the accession of Vespasian.
3. From B. C. 43 to the death or Trajan.

Now should he select the third period it would be to his advantage to be well prepared on the Annals, the Histories and the Agricola of Tacitus; on Suetonius, Lives of Vespasian and Domitian; and the letters of Pliny.

In Philosophy the student will be examined in Plato's Republic, and Aristotle's Nicomachean Ethics or Aristotle's Politics, together with the history of philosophy both ancient and modern. Logic will include questions in Metaphysics and Psychology, and the student is recommended to study the logic of Aristotle and Bacon, as well as modern logic. The examination lasts six days, there are twelve papers of three hours each. The average student spends the best of three years in preparation for this examination. During term time he writes one essay a week on some historical, moral or philosophical problem. He spends one hour a week with his tutor in informal discussion on either the essay he has written or on some problem relative to the work in hand. Here one is tempted to speak of that excellent tutorial system which makes any course, but especially the Greats course, not only profitable, but possible, but that would be wandering too far afield. Suffice it to say that at the end of three years the student has developed the essay writing habit, and since the tutor is insistent on excellent diction, he has developed a fine essay style. The whole examination fits in with this scheme, for, while there are nine questions in each paper, the student is encouraged to answer not less than four, or more than six. He usually does three questions in detail and the fourth in outline, consequently he has a chance, since catch questions are unknown, to discuss problems, in fact write three essays for each set of questions.

It is impossible to call such a course narrow. Nor can one say that the insistence on so much Latin, and especially Greek, is out of proportion to the rest. The Greats man who takes his work seriously is the last man to make such a complaint. Strange to say that Oxford has never lost sight of a truth, which this country seems loath to learn, that Plato's republic and Aristotle's Ethics are still the fountain head of all philosophy, ancient and modern. Only a short time ago a teacher of philosophy in one of the colleges in this state, who had taught the subject for several years, remarked to the head of the Greek department of the same school, "I am really becom-

ing convinced that those old Greeks did know something after all." Better late than never, but what a pity that it took him so long to find it out.

It cannot be denied that the Literae Humaniores course, or Greats, is still Oxford's ideal of a liberal education. Its aim is not specialization for any single career, but to give a man such a mastery over the processes of thinking and judgment that he brings into whatever special career he afterwards takes up, a mind, which, while applying itself to details, can see the general principles and wider aims of his work.

I have taken the liberty to go into the discussion of the Greats course in some detail, for the simple reason that in no other course is Oxford's estimate of the classics, both as to their intrinsic worth, and method, better illustrated. Greats presupposes the classics, in fact is impossible without them. One sees clearly from this that Oxford does not treat the classics as an isolated department of knowledge, but rather as having a direct bearing on the whole scheme of things.

I could illustrate the same principle from the use to which Latin and Greek are put in the work in Theology. A thorough knowledge of the Greek New Testament goes without saying. When one starts the early history of the doctrine and dogma, he reads patristic literature in the original, when he takes up church history, he starts with Eusebius Ecclesiastical History in Greek.

This method of relating a single line of work to the larger whole is equally true of Oxford's system in the modern languages. A man for instance takes his B. A. in German. That seems little enough for an honor degree. But as a matter of fact the man hardly takes what we call taking German. When he starts his work in German, he is supposed to know enough of that language to take lectures delivered in that tongue. He does more than read German stories and novels, even more than read e. g. Lessing, Goethe and Schiller. He devotes no little time to phonetics and philogoy. He reads the gospel of Mark in Gothic. He must be able to read the Althochdeutech, and see how that grew into the German of to-day. There is besides German history, science and life. He must know the systems of Germany's Greatest philosophers, Kant, Hegel, Fichte and Schelling. No one can call such a course narrow. Here as in the classics the course touches every side of culture. "It gives the student an intimate acquaintance with the source materials; it teaches him how to work and think and how to value appreciatively and critically both his own efforts and the efforts of others. It teaches him to distinguish between the genuine and the spurious; it gives him scope and incentive for individual effort and research."

How different things are with us. We dabble in a great variety of subjects, but fail most gloriously in helping the student to see that there is an essential unity between them. It is hard for him to detect any relationship between the various subjects he is supposed to master. The most

hopeful sign is that some of our leading men are becoming convinced of the weakness of our system. In line with this Dr. G. Stanley Hall very aptly remarks, "Most boys, and even more girls, who begin German, and especially French, never command it sufficiently for much use in either speaking or writing. If it lapses into disuse there is educational waste as there is where any study aborts. A few terms of languid application, a few score pages read, a few authors dabbled in with the aid of the teacher and the incentive of marks, social stimulus of fellow-members of the class, competition, and then oblivion means mental tissue left to disintegrate." The identical thing can be said of much of our efforts in the way of teaching the classics. The students in our High and Preparatory schools look upon Latin, Greek being out of the question, as a study wholly unrelated to anything else either in the curriculum or out of it. It is an excellent mental drill, that, be it said to his credit, he feels he needs, and therefore he submits to it. He generally misses the best that a study of Latin could give him, viz, a method for work, and the elements of a sound historical perspective. Enough that Cicero wrote the orations against Catiline, though when either the orator or the villian lived is of little concern. Last fall starting De Senectute with my Freshman class in College, I asked a young lady who had just come from that excellent High School system in Chicago, what she could tell me about Cicero. It amounted to this, "He was born in 100 A. D., had the singular good fortune of travelling to Athens, where he became an intimate friend of Plato, who was lecturing there at that time." It became clear that she had never studied her Latin in the light of her Roman history, at least had never realized the intimate relation between the two. The first impression the boy or girl gets when they leave the grades is the very evident separation between the various departments. The doors are distinctly labelled, that room is sacred to history, that to Latin, and that to Mathematics, and as he leaves one sanctuary he had better shake the dust off his feet, lest he defile another. Yet if we wish again to realize the lasting good which the classics, or any study can give to our students, more of the Oxford method must be followed.

Our educators are more or less agreed that all branches of knowledge are connected together, and that the Sciences into which all knowledge may be said to be cast, have multiplied bearings one on another, and, consequently, owing to an inherent relationship, one does violence to any subject if he treats it as wholly unrelated to any other, yet in practice that principle is disregarded, to the great harm of those who seek instruction.

Oxford realizing the intrinsic worth of the classics, combines them with history and philosophy, two subjects of widest scope, in fact considers an adequate knowledge of either impossible without the classics. So she realizes her aim of training men, who, when they leave the University, can, as Sir William Ramsey has well expressed, "see the principle in the detail, and reconstruct the detail from the principle, and to remain clearly conscious all

the time of the distinction between the principle and the detail." Those words involve a principle that has the widest possible application. It applies to law and equity, to business and politics, to religion and government. But it takes the right kind of training to enable a man to apply it.

Oxford's estimate of the classics is not a false one. When she offers four prizes annually for the best work done along classical lines, one prize amounting to $275.00, she does so to arouse a genuine interest, in order to encourage students to work along lines that will yield large returns.

A REVIEW OF PROF. BEZARD'S "COMMENT APPENDRE LE LATIN A NOS FILS."

OLIVE SUTHERLAND, DETROIT.

Much of late has been the discussion, both written and oral, of the Latin teacher's problem, but I doubt very much if there is in existence another so comprehensive and so all-embracing a volume on the entire subject, as Prof. Bezard's book, "Comment Appendre le Latin a nos Fils." The title is self-explanatory. The problem of the author, an experienced teacher of Latin in the senior year of one of the typical high schools in France, does not materially differ from ours; hence of much value to us are his methods of solution, already worked out in part in his own and his colleagues' classes and rich with possibilities of even greater results. His aim is that of progress; yet he is not a sensational rational. If the old way has failed because of innate weakness, he would find a new and better; if it has failed because of undesirable present conditions, he would seek to improve those conditions rather than add chaos to chaos by overturning all.

His book itself is a pretentious volume of some four hundred pages, including not only a more or less brief statement of each theory, but a detailed report of its application not only in every class of the six-year course, but also in the year preceding the study of Latin. It is here, he affirms, that the foundation is laid for the whole superstructure.

Unless there is intelligent coöperation on the part of the elementary teacher, who gives the child his fundamental training in his mother speech, with the Latin instructor, who is supposed to give him a clear insight into the complicated structure of an highly inflected foreign language, there can never be obtained by the latter educator any profitable or beneficial results.

Would that those who hold the places of final authority in all our public school systems had this sane and logical viewpoint! Most of us under present conditions are trying to build stone houses on a foundation of shifting sand. Indeed, Latin would have long since proved a greater failure in

many of our high schools than it is now generally conceded to be if a few so-called "old-fashioned" grammar school teachers were not left, brave enough to stand out against a system, clever enough to elude authority, wise enough to refuse to leave to "inference" the function of an adverb and to actually insist upon clearly explaining what is the direct object of a transitive verb.

Having shown the absolute necessity of practice in word and sentence analyses in the mother tongue before attempting to do anything at all with Latin, Prof. Bezard next mentions and explains the "tools" which each pupil must early learn both to make and to use in order that he may do successful work in Latin. These are: (1) Tables of Declension and Conjugation, (2) Tables of Syntax, (3) Vocabulary Note-books, alphabetically arranged. The first of these are for use especially in the first year of preparatory Latin, the second two may be replaced after the first year by permanent note-books, large enough to contain all the material acquired during the remainder of the Latin course. That they may be of most value to the pupil each child with the assistance of teacher or parent is to make these tools himself; thus is opportunity given for individuality and originality.

The tables of declensions and conjugations, consisting of printed paradigms cut out of old grammars and mounted on large pieces of cardboard, are for the purpose of aiding the memory by permitting at a single glance of the eye comparisons to be made and differences noted.

The second "tool of labor" is a home-made simplified and systematized grammar, illustrated copiously throughout with typical Latin sentences and their translations, which the pupils have themselves chosen from the various authors they have read. The most practical form this may take is possibly that of a note-book, the even pages of which shall contain the tabulated constructions in logical order with illustrations taken from the grammar of one's choice. The opposite pages shall be reserved for the illustrations chosen by the pupil. Of course it is needless to say that the arrangement of the work on the even pages must not be left to the judgment of the beginner, nor even to that of a pupil of ordinary ability in the advanced courses.

For the purpose of visualizing the whole subject of language structure a large chart may be made containing for a single glance of the eye the whole scheme of syntax. The model chart given by Prof. Bezard is an arrangement of constructions in two principal parallel vertical columns, the second of which is further sub-divided into two. The first column contains a list of all the elements of the clause, grouped as follows: (1) subject, predicate and attributes; (2) complements, direct and indirect; (3) adjuncts, etc. The second provides for the elements of the sentence with an arrangement in the two sub-divisions of the indicative and subjunctive clauses respectively. Here the clauses are classified, as (1) independent, (2) complementary, (3) clauses performing the function of adjuncts. Thus throughout there is a carefully

worked out parallelism evident to the eye between the structure of a clause and the structure of a sentence.

This whole scheme seems to be admirable for two especial reasons: first, the pupils in this way, as in no other, derive an intelligent and appreciative knowledge of the principles underlying all accurate language study; secondly, there are no dead and meaningless rules to be memorized but in their stead vital examples taken from the language itself, one of the most excellent phases of the "direct method."

I am sure that most of us have had our troubles in teaching vocabulary to our pupils, and are, like Prof. Bezard, heart sick of the continual thumbing of dictionaries and glossaries, which we know is a most wearisome and wasteful use of time and energy on the part of even our best Latin students. Listen then to this prophet from across the sea, who has found a way, which, if carefully and zealously followed by both teacher and pupil, will in time do away with that most tiresome "bug-bear", the Latin lexicon! The solution is as follows: Let the pupil begin early to make his own dictionary, receiving much aid and many suggestions from his teacher. A temporary alphabetical note-book should be in the possession of each pupil at the very beginning of his Latin course, even though the one made during his first year and containing only the simpler words be replaced by a larger one when he begins his reading of Latin authors. Before the words are written in the note-book they should be carefully worked over in class with the aid of the teacher, then learned thoroughly.

Prof. Bezard speaks of three methods whereby words and their meanings may be more easily remembered; consequently he gives three ways of arranging them in the note-books. For instance, under the letter *V* may appear *video,* its principal parts, its meaning, and a list of derivatives in the mother tongue which the pupil adds to from time to time, as he thinks of them, or as they are brought to his notice. After a space of five or six lines, reserved for the compounds of *video,* or Latin words showing the same root, which the pupil will encounter at a later date, appears the word *vinco,* treated in a similar way. Six lines below *vinco,* the space between being reserved for words in the same family, is the quotation *"Veni, vidi, vici"* with its translation. Under the letter H appears *hostis,* public enemy, while beneath it, though a little to the right, is *inimicus,* personal enemy. These examples will help to show that whereas the general rule is to group the words in "families," so to speak, any other guide to memory, such as association of words in a familiar quotation, or a logical grouping based on likeness or direct contrast in meaning, may determine in part the arrangement.

The permanent note-book, which will be used by the pupil throughout the whole of his subsequent study of Latin should be begun the second year. The following rules should be observed: (1) No word is to be used in any exercise without having been first learned by heart as it appears in the note-book; (2) the words must be written in the note-books according to

families with the primitive or concrete meaning of the word first, followed by the series of derived meanings; (3) since certain words derive meaning from a particular phrase or group of words in which they are used, often the entire expression must be written in the note-book with its corresponding translation. The practical use of this sort of vocabulary study is seen in the following instance. The word *tumultus* is under discussion. The general notion in the class seems to be that the word necessarily denotes a noise. Put it in the note-book under *tumeō,* where it belongs, and not only is this impression corrected, but four other Latin words are more easily remembered by their connection with it. Thus:

tumeo, tumere=to swell
tumidus, a,—um=swollen.
tumor, tumoris=a swelling, a rising.
tumulus,—i=a swelling of the earth, a mound, a small hill.
tumultus,—us=rising of the people.

So much for the "tools" with which the Latin student is to work. Prof. Bezard next proceeds to discuss in detail the methods of conducting the recitation. Our author is a teacher in the complete sense of the term, and not a mere hearer of lessons. He is not only a strict proposer of tasks, but a genial worker with his pupils, thus inspiring them to a full exertion of their powers. With him equal emphasis and equal time is put upon that part of the class period devoted to the preparation of the future assignment as upon that devoted to the recitation of the past. When translation of connected discourse is first taken up, Prof. Bezard goes so far as to give to the class with the aid of a pupil or two of superior ability, a preliminary translation of the entire assignment for the next recitation. The members of the class, with the guidance of the teacher, then work out the meanings of all unknown words and put them in the proper place in the note-book. The home work consists of a careful analysis of every sentence, the study of all syntax involved, absolute mastery of vocabulary, and a final translation of the passage. No time wasted in hunting for words so apt to be forgotten before the next day dawns, or at best remembered only in connection with the particular context in hand! No inane parrot-like repetition of rules without any sane appreciation of the structure of the sentence! To what excellent use is put every minute of precious time!

Oral exercises in the class have, in the opinion of our author, a greater value than the written, even when it comes to a question of the "theme", or in our terminology, "prose". Oral work proves an efficient means of both increasing the working knowledge of the pupil and of affording him practice toward the complete mastery of old material. Written translations and all "prose" compositions are only profitable in so far as they give the student a better control of all information previously and otherwise gained. Since Prof. Bezard believes this is the only value which such exercises can produce he does not hesitate to offer as good substitutes for written com-

position work frequent reviews of the material in the note-books of vocabulary and syntax, and also a rather novel form of oral imitative work. In the example of the latter offered the pupils read the French translation to the teacher who replies by giving the Latin of the text. The pupil then, with the French before him, repeats carefully the Latin as previously given by the teacher.

The process of teaching pupils to translate is not a haphazard affair with Prof. Bezard. He has a definite plan of work for all to follow, and with the assistance of his fellow teachers this plan is insisted upon from the very moment the pupils meets with his first Latin sentence until he leaves the high school with classical honors. Each passage assigned for translation must first be read through from beginning to end for the purpose of discovering the main thought. This must be done before all else. Then the text must be divided into as many sections as the sub-divisions of the main theme allow. After this has been done comes a careful analysis of the structure of each sentence, the meaning for the time being occupying a subordinate place. A good working knowledge of forms and syntax must be possessed by the pupil before this preliminary analysis is at all possible. The last step is to translate the sentence, not word by word, but word group by word group, following as nearly as possible the order of the Latin and finding the meanings of the words by deriving from the primitive sense of the word the particular meaning suitable to the context.

You can readily see that a pupil who has been consistently trained in this way can scarcely complain with justice that he has read Caesar's "Gallic War" without knowing what he was reading about, or that he has translated Cicero's "Manilian Law" without following at any time any argument of the orator. Under this plan it is also as clearly evident that there can be no haphazard assignment without due regard to the thought of the text.

Judging from the results recorded in his book Prof. Bezard is indeed marvelously successful in developing in his students an enthusiastic literary appreciation of the authors he reads with them. Translations by French authors and modern works on parallel subjects are used to vivify and strengthen this important part of the work. In comparison with the course as arranged for the American high schools, the French seems to cover a wider range of choice of material. The fables of Phaedrus, selections from Caesar and from Livy, some of Virgil's Georgics and portions of the Aenead, likewise a few of Cicero's letters and philosophical essays are all treated at some length with regard to literary value, and the reaction on the pupils recorded. I may be unduly skeptical on this point, and my reasons for being so entirely wrong, but I do not hope from the ordinary American school boy, even with the best of training, any such testimonial of his sincere appreciation of the poetry of Virgil as Prof. Bezard obtained from several of the pupils of the fifth year.

If the authors which tradition has selected for the perusal of our high school students can be made to mean but little to our boys and girls, let us

banish them into everlasting exile and find others that will. In any case let us not be satisfied with our efforts until the language that we teach ceases to be a mere mechanical frame-work perfectly fitted together and distinctly lacking a vital power; let us put forth every effort and try every means to have it become the perfect channel it is so well fitted to be for conveying to the minds we wish to mold the electrifying force of real live ideas.

MODERN LANGUAGE CONFERENCE

WILHELM HAUFF.

MISS ALICE E. ROTHMAN, ANN ARBOR HIGH SCHOOL.

Wilhelm Hauff's literary activity presents a study of fascinating interest, tantalizing speculation, and intense regret. Of fascinating interest, because the products of his brief span of writing are so manifold, so diverse; because his imitations of those writers he admired, present such a new note and results quite original, while his use of the weapon of ridicule against those he disliked is so clever, so amusing and yet so fatal; and above all, because his writings are permeated with a clarity and a saneness wholly unique at that age, and therefore refreshing. And it is this characteristic of clarity and sanity which significantly marks Hauff as pointing the way towards a higher, more wholesome plane in German literature. And here, too, probably lies the key to his popularity which has survived to this day, especially among the general reading public, while his more noted contemporaries and predecessors are now vegetating within the confines of a history of German literature and their works are read as a task rather than from predilection. And so the study of Hauff leads to the irresistible speculation, *how* his unique talent would have developed; if it would have unfolded into genius; what the mine of invention, the surface of which his facile pen had but barely scratched, would have yielded under the pressure of life's experiences and trials. And we leave his works with a poignant regret that an inexorable fate had cut off such a wellspring of bright promise, has hidden behind its impenetrable veil, whether German literature has lost, thru Hauff's untimely death, a genius or merely a talent.

The life of Wilhelm Hauff moves within a very narrow circle of years and environs. For it lies almost entirely within the first quarter of the nineteenth century, and aside from a few months of travel, his life was lived within a very limited range of the Swabian territory. He was born in Stuttgard on Sunday, November 28th, 1802, and died on Sunday, November 18th, 1827. August Friedrich Hauff, at the time of his son's birth, was serving a

prison sentence because he had been suspected—unjustly, it was later proved—of an unfavorable attitude toward the government. Although he was later released and restored to his former official position in the ministerial department, the rigors of these nine months in prison doubtlessly shortened his life, for he died when Wilhelm was but seven years old. Hence he could not have had much influence on the development of the child. Yet from his father Hauff inherited his attractive personality, his keen, clear-sighted mind and a certain boldness of spirit, well characterized by the German word Freimut. But to his mother he owes, in common with so many German poets, his vivid imagination and his literary talents, especially that grace of style which can cast a halo of charm and interest about even trivial and commonplace matters.

After her husband's death, Frau Hauff removed to Tübingen to be near her father. It was this grandfather, to whom Wilhelm Hauff later pays such a tender and poetic tribute in the Fantasien, who became a powerful element in the psychic unfolding of the rather delicate child. Wilhelm's early school-life apparently was a very minor influence; he was considered a poor scholar, especially since his studious and painstaking elder brother Hermann afforded his teachers opportunity for a comparison quite unfavorable to Wilhelm. Two elements outside of school contributed largely to his intellectual growth; his love of nature found ample food in this lovely region, and he had the opportunity for unrestricted browsing in his grandfather's well-stocked library. Here in the early years he and Hermann found material and locality for the games they loved, of knight errantry, of battles, of magic and enchantment. Walter Scott tells us how a spell of illness gave him the interminable privilege of indiscriminate reading, until satiety put new interest into works of history and travel. So Wilhelm was turned loose upon an ocean of all sorts of reading, good, bad, indifferent, with no other compass or pilot than his natural bent toward mental health and saneness. At Blaubeuren, where he spent the years 1817 to 1820, he devoted himself to theology and philology, for in those days the function of teacher and preacher was still inseparable. His years were busy ones here, yet he found time for many excursions in the vicinity and to Ulm, thus laying in a store of local knowledge which was afterwards utilized in the writing of Lichtenstein. Four years later, in October, 1824, he took his Ph.D. at the Protestanische Stift at Tübingen, a school founded in 1536 by the hero of Lichtenstein, Ulrich von Würtemberg, and one where so many noted men have drawn inspiration. During one of his trips, he had made the acquaintance of a cousin to whom he became affianced. He wished now to marry her, yet he was amenable to council, which suggested some experience in earning a livelihood as a teacher, before assuming the responsibility of marriage. And so he was installed as Hauslehrer in the cultured and socially prominent family of Baron von Hügel in Stuttgard. During the year and a half in this atmosphere of culture and refinement, he had rare opportunities for personal improvement

and social polish. He received all possible encouragement from Frau von Hügel, and in the abundant leisure which his position afforded him, he developed an astonishing literary activity. And since this was so well received his natural bent was soon chrystalized into a resolution to make literature rather than the pulpit or the teacher's desk, his lifework. A six months' continental tour gave him a personal acquaintance with Belgium, France, and especially with northern Germany. Berlin was at that time the literary center in which the Mittwochsgesellschaft wielded considerable force in criticism and in the promotion of talent. Here Hauff was most cordially received and here, too, he made the acquaintance of many notable literary lights of the day. At Dresden began his friendship with Ludwig Tieck which proved of lasting value to the young writer. On his return he was appointed editor of the Morganblatt, the organ published by the powerful Cotta firm, who had captured the copyrights of Goethe's and Schiller's works. Since his pecuniary position was now assured he married his cousin Louise. This was in February, 1827. Life now lay before him with brilliant prospects for fame, personal happiness and a satisfying activity. In August of the same year plans for a historical novel based on the Tyrolese rebellion of 1809, took him to that country for material and local color. Shortly after his return in November his unexpected death after a brief illness plunged all Germany into deep grief. Of the novel only fragmentary notes remain.

Since Hauff died so young, his literary activity naturally can be discussed only from the standpoint of his growth towards artistic achievement, not as the work of a finished genius. But when we recall the narrow range of his life experiences and the brief range of three short years of writing, then we must concede two points, a rare natural gift with a wonderful mine of unrevealed versatility, and the possibility that his early death robbed the literary horizon of a very bright star just in its ascendency. That the first product of Hauff's talent was a collection of fairy tales is not so strange when we consider the great interest taken at that time in fairy lore, and especially in that of the Orient. Almost all famous writers of that age had tried their hand at this form of narration. The Grimms had published their famous collection between 1810 and 1815. Yet there is possibly a deeper reason which impelled Hauff to seek expression in this form. Like his famous prototype, Walter Scott, he was a born story teller and like him, this talent was fostered by the appreciation of his friends and associates. At home he had often entertained his sisters with tales of wonder and enchantment and in the Hügel family his young charges kept his art in constant practice. Encouraged by Frau von Hügel, he published in 1825 his first Marchenalmanach, and popular approval called forth several such annual collections. While Hauff's Marchen cannot claim the distinction of great originality, nor do they charm by the mystic symbolism marking the Grimm collection, they nevertheless reveal such vivid and distinct imagery they people the fairy world with forms so plastic and tangible and, more-

over, are told in language so clear and graceful, that their fascination is perennial, a fact suggesting an interesting comparison with the similar literature of his more famous predecessors.

There was in Hauff's buoyant and sunny nature a strange vein of satire, which found expression in two longer works. In the Memoiren des Satans we undoubtedly have a literary offspring of Hoffmann's Die Elixire des Teufels. But just here the difference is very striking between Hauff and his North German model—whom a strange irony of fate makes the compatriot of Kant. Hoffmann pictures essentially human beings possessed of the daemoniac spirit; Hauff introduces Satan in person as his hero and makes him, in fact, a youthful, quite delightful and rather harmless demon. Those uncanny elements hovering on the borderline between human life and the spectral world, the grim shadows of sin and corruption in the human soul, the creeping horrors of melancholia, which Hoffmann's peculiar gift could paint so well, these are entirely absent from the naively graceful and yet wholly rational spirit of the South German. In fact, as one critic expresses it, in Hauff Hoffmann's uncanny talent seems to have become spiritually normal. During his student days Hauff had sketched a story, Der Mann im Mond, in imitation of Karl Heun, an author of trashy fiction very popular at that time. Later he changed this into a satire, signing it, H. Clauren, the anagram on Heun's name, and this work proved so clever and successful that he had to face a lawsuit brought against him by his enraged prototype. Undaunted by the decision against him, he issued a pamphlet, "Kontrovers predigt", where he used his weapon of ridicule with such telling effect that he completed the destruction of Clauren's popularity and so did good service in liberating public taste from the fetters of such "Hintertreppen" literature.

Of his poems two certainly will preserve his name in every German heart: "Steh' ich in finstrer Mitternacht", and Reiter's Morgengesang, for they have caught the very keynote of the old German folksong so perfectly that the signature of a definite name to them comes as a surprise. In the Novellen, his five or six short stories, the influence of Hoffmann and Tieck are still predominant. While they show immaturity of characterization and crudeness of plot development, they nevertheless seem to indicate that in the sphere of narrative prose lay Hauff's real power; especially since the last story he wrote, Das Bild des Kaisers, reveals not only great originality and development but such keen power of creating tangible, living figures that one is impelled to murmur against a fate which prevented the unfolding of this talent. What other writers with more famous names failed to accomplish, namely to educate the taste of the great body of common people, and so add to *national* culture, for this we may give Hauff credit, because he combined entertaining and popular content with artistic and elevating form. We may regard him therefore as one of the first in that rich field of German literature, the short story, and so as a forerunner of Paul Heyse.

It is the spirit of the old Anakreontic muse, of Horace, that seems to

play through the Fantasien im Bremer Ratskeller. Nowhere else do we see Hauff's style and charm in such perfection, nowhere more his poetic power, his depth of tenderness, his mature seriousness. And yet it is all light, frothy, sparkling, like sweet champagne—and as intoxicating. In the twenties and thirties there was no more popular author in Germany than Walter Scott. And his ability to tell a fascinating romance is not the only reason for this. His high morality and sane views of life appealed to a kindred spirit in the German heart. His devotion to his country, his patriotic pride in its history; in its ancient customs, fanned the awakening ideals of German nationalism to vivifying warmth and ardor. Hauff draws an amusing caricature of a translation factory which attempts to satisfy the popular appetite for the works of the "Great Unknown." One German writer even attempted to pass off his own invention as a genuine Scott translation. Hauff shared the general admiration and after a careful study of Scott he determined to try his hand at a historical romance. The result was Lichtenstein. In the historical novel as represented by Scott and Hauff we have the earliest form of this species, namely the romantic type, which presents a poetical and idealized picture of historical persons and events for the purpose of glorifying the past. And Hauff's Lichtenstein is more purely romantic than Scott's Quentin Durward, which I am inclined to regard as its direct inspiration. In both novels we have a powerful historical character who almost overshadows the hero. But while Scott has given us an essentially historical delineation of the cruel and crafty Louis XI, Hauff has idealized the harsh and erratic Duke Ulrich of history into a noble and heroic outcast, whose Christian fortitude and patience in the face of distress and treachery arouse our warm sympathies.

The plot of Lichtenstein is sketched against the historic background of Duke Ulrich of Würtemberg's struggles with his rebellious subjects, with the Swabian league and with his own peculiar temperament. It deals with the fortunes of the impecunious but dashing hero, Georg von Sturmfeder, in his suit for the hand of Marie von Lichtenstein, whose father is the Duke's most loyal supporter. Georg's success is wholly dependent upon his devotion to the cause and the person of Duke Ulrich and the latter's ability to regain his capital, Stuttgard, and thus his country, from the encroachments of the powerful Swabian League. The narration of the struggles in attaining this dual goal is full of thrilling adventure, hairbreadth escapes, romantic situations, and noble deeds in the face of the opposing machinations of the hostile forces. But the triumphant entry of Ulrich into Stuttgard with the resulting union of Georg and the heroine does not end the story. Another period of trial and misfortune gives Georg further opportunity to display his steadfast devotion to Duke Ulrich, even at the risk of his own life. In the end the hero enjoys the rewards of loyalty and noble character although the success of Ulrich is delayed until the millstones of life have further ground off the irritating angles of his unfortunate temperament. As may be judged from even this meager suggestion of the plot, there is nothing

complicated, nothing taxing the powers of understanding, nothing psychological or philosophical in the story, it is just a simple tale of love, sorrows, dangers, with a happy ending. It is a romance written by a youth, and so permeated with the radiance of youth and its vividness.

Here, I imagine, lies at least one of its appeals to the immature reader. Yet Lichtenstein is distinctly "worth while," for several reasons. It is the first real historical novel in German literature; its sentiments are essentially clean and wholesome; its characters, wellwrought and distinct. Then its style is so charming and smooth, the humor so infectious and captivating, Hauff has the boldness to touch even the sacred persons of his hero and heroine with the bright colors of his graceful wit. And lastly, its lofty sentiments and noble ideals, presented with a delicate and often a subjective touch, bring the tale very near to our heart if not to our intellect. It has been said of Hauff that immaturity mars his delineation of character. Yet we must concede to him the power of variety in characterization. In Lichtenstein alone there is quite a gallery of boldly sketched and sharply differential persons; some of these delineations deserve immortality, so the naive and adorable Bärbele with her deliciously quaint Swabian tongue, and admirably foiled by her buxom and humorously stupid mother. And surely the wonderful portrait of the Pfeifer von Hardt with its pathos, its lesson in vigor, loyalty, devotion as an atonement for earlier wrongdoing is one of those rare creations none too common in our literary galleries.

One of my pupils, in expressing opinions concerning Scott's Quentin Durward and Lichtenstein gave the palm of preference emphatically to the latter. As a reason was given that the latter "seemed so much more real because it was not so full of cruel episodes and awful deeds as was Quentin Durward." Unconsciously this pupil interpreted as a good point what is usually considered a grave fault of Hauff, namely, he pictures the conditions of the early sixteenth century entirely in the more humanitarian light of his own day. However disconcerting this lack of chronological verity may be to the well developed historical sense,, it is of distinct value to the untrained mind, for it presents noble ideals and pure sentiments in a guise readily comprehended and appreciated by the young and the untrained. Another point on which such reading is decried by certain modernists is, that it gives our young people a biased and unreal outlook on actual life. Personally I cherish the opinion, that a fostering of high ideals and fine sentiments is of infinite benefit in the readjustment of life's values which must necessarily come to every human soul when confronted by the often sordid and always sobering facts of real existence. For it means the cherishing of a distinct ideal of right living, without which existence would be often insupportable. It has always been the discontent with surrounding conditions and the resultant desire for betterment, which has kept aflame the torch of idealism as it lights the struggling soul to an ever higher, purer plane of life. And I consider Hauff as one who has added his little share of oil to the beacon light of idealism.

HISTORY CONFERENCE

THE HISTORY COURSE AS AN EXPRESSION OF THE INTERESTS OF TO-DAY.

MR. L. A. CHASE, HOUGHTON HIGH SCHOOL.

Your chairman has asked me to say something regarding our course in history which seems to correspond to some extent at least to the recommendations of the Committee of Five. The course was in fact not framed with special reference to these recommendations, but is rather the outgrowth of the experience and the convictions of the instructor. It calls for the following assignment of subjects:

First year: European History (including the beginnings of civilization and Oriental history) to about 1700 A. D.

Second year: European History (including current history) to the present time.

Third year: American History (including current and local history).

Fourth year: Civics (including current history and the study of current economic and social problems).

Let me say frankly that my experience with this course is at certain points at present incomplete. Our texts in European History are new and now being used for the first time, and hence, at this writing, have not yet been pursued to the end. So far as it goes, our experience with the course is satisfactory. Let me say also that any course of this kind is quite surely the expression, in its working out, of the bias and prejudices of the instructor. I freely confess to prejudices and have not sought to suppress them in what we are trying to do. My experience, therefore, may not at all points be a guide to others. What follows, while it may seem at points just a statement of general principles, does in fact represent the view of history which we are hoping to realize. It is a view which is not fixed but will change with new light and further experience.

If one asks why history is studied at all, I suppose he finds his reason in a desire to satisfy a normal mental craving to know what is the background for an existing situation; as, for example, to learn how exchanges of bank credit were effected formerly as compared with the present time; or, by an appeal to the conservative factor in human nature, to justify the maintenance of the status quo by an appeal to the past; as, for example, a condemnation of the recall of judges by a reference to experience; or, again, the demand may be for an abandonment of a certain course of life because experience shows it to work badly, as witness the historical basis put forward by the Socialist propaganda. And one may merely wish to get his bearings—of great practical importance, as one must realize who, from week to week,

reads the financial articles in the "New York Evening Post" or "The Nation." In all such cases a present interest is the basis for a recourse to history, and few are the historical workers—I imagine—whose thinking is so abstract that they can free themselves wholly from such pragmatic considerations.

Just now the struggle being maintained between the nations beats in upon our thoughts incessantly and with even painful reiteration. It is so colossal and all-embracing that one might suppose it would exclude other times than this from our minds; but it in fact trails behind it a multitude of ghostly circumstances which our minds conjure up in this awful presence. German militarism suggests French militarism of a century ago. "War zone" decrees suggest French decrees and British orders in council of that time, and it is so also with the status and work of the British navy. German military organization suggests the reforms of Scharnhorst and may even take the mind back to the military organization of the Roman Empire. Or the suggestion of the past comes by way of contrast. Having an appreciation of the American situation in the last great world struggle, derived from the unrelenting discourse of Mr. Henry Adams, one notes a difference in the present situation. Our protests on the detention of ships, the misuse of flags, the destruction of neutral ships and cargoes—and the whole question of neutral rights in general—has a significance that it lacked then and will receive consideration now which they did not get then.

With the War left out, contemporary life has been sufficiently complex to call for historical study if only to keep our heads and our bearings. Shall we engross ourselves in cubist vagaries or shall we remember that there was once an artist called Angelo who did something worth looking at? Or, on the other side, shall we damn the output of contemporary modistes and forget that we have at least got by farthingails and ruffs? Shall Kansas order its women to desists from wearing earrings and recall not the workings of similar legislation in seventeenth century Massachusetts and in Rome in the days of Cato? Shall we plunge into the abyss of unrestrained eugenic legislation and forget that some people had survived without it? Shall we goad our lawmakers to renewed efforts to make us a complete democracy and forget the lessons of the democracy that we have? Well, the teacher of history at least should keep his head and should aid his pupils in doing so, and occasionally unmuddle the ideas of editors rather than beat the tomtom in the dance of "the latest thing" in sight.

As a teacher of history—as an implanter of historical notions (if that sounds more accurate), I have discovered that my work grips my pupils quite in proportion as it seems to illuminate the present in accordance with one or more of the principles I have been developing. One instructor with whom I had occasion to discuss a certain recent text in history, was greatly disturbed because the book did not devote much space to the conflict between Patrician and Pleb in early Rome. The obvious fact was that she had

happened to devote some special attention to this subject in her work at the University and was thus possessed of a familiar corner in her universe which was to her very cozy and satisfying but which to high school freshmen made no appeal whatever. Had the volume attempted to satisfy the requirements of the mentioned teacher it would most certainly have been "taboo" to the boys and girls. The teacher had not observed that this same book discussed the use of copper in early times—a matter of much local interest and appreciation—it took note of modes of travel, living, writing, and fighting in which even boys and girls are interested through contrast and comparison; and if it may not have presented them with as many battle thrills as they craved Herodotus and Thucydides were at hand to fill the void. When these same pupils become sophomores, they will want to know some of the early history of the steam engine, of steam boating, of mining and smelting. It would be rather too much to expect them to grow enthusiastic over "The Social Contract," but when quotations from it are read conjointly with the opening lines from the Declaration of Independence, some matters dawn on them of which they had hitherto been oblivious and such new light will some day do them good. As freshmen the religious and intellectual situation in the Greco-Roman world about the year 1 of our era would hardly compete with the Athenian expedition to Sicily in interest, but they will get a glimpse of its importance and will store up some ideas against the day when such matters take a larger hold on their thoughts. The steps in Italian unity may be wearisome to the mind of John and Jane in the tenth grade, but, having interestedly followed the course of the European War from week to week, this Italian unity question takes on some real significance to them as they wonder just when Italy will take "a crack" at Trieste and the "Trentino."

Unless the course in history be purely formal, probably no two classes will have it presented in the same mode. Taking European History: in 1904 and '5 the aspirations of Russia and Japan called for emphasis; last year, the ambitions and mutual relations of the Balkan countries; this year, it is the civil and military organization of Germany, the racial interaction of Europeans, questions of international law, treaties and alliances, economic forces and colonial interests that demand appreciation. It may occasionally be newspaper paragraphs that establish for a moment this connection between past and present. Considerable use of this material is made at Houghton—with due reserve, of course,—and with good results. It may be a report in the New York "Times" of a discovery of Greek surgical instruments in Asia Minor; or an account of Masonic Activities in Massichusetts just before the ride of Paul Revere on a memorable April day, appearing in the "Christion Science Monitor;" or a discussion of work of Copley and American art in his day in the "Boston Evening Transcript;" or an account of contemporary conditions in Palestine found in the New York "Evening Post." Such newspaper disquisitions are called forth by some recent occurrence and may be used to "touch off" some dry-as-dust lesson in the text. My practice

is to lay such clippings on my desk and at the psychological moment bring them forth. Those not likely to be of immediate use are stored away in labelled envelopes for future consumption.

The weekly lesson in current history, based on such a magazine as "The Independent," "Outlook," or "Literary Digest," will almost surely have in it points of contact between past and present—between the pupil's current interest and the contents of his history text. How is naval warfare now unlike that in former wars? What is the history of the submarine? What was the origin of Belgian neutrality? How was our taking of Vera Cruz in 1914 unlike a similar event in 1847? What was agreed upon in the Hague Conventions? Why did Italy not regard herself as bound by the terms of the Triple Alliance? Why is there a break in the railway connecting Finland and Sweden at the boundary of the two countries? Why is it proposed that the United States should pay Colombia twenty-five milion dollars? From week to week pupils have presented to them a procession of occurrences which call for explanation in the light of history near or remote. If such queries can be satisfactorily answered—and they are susceptible of a satisfactory answer—not only present, but also the past as set forth in the text, take on a far greater interest.

And this text should be one written with a view to current interests. Books of history reflect the dominant interest of the age. Once that dominant interest was ecclesiastical; again it was political; now it seems to be social and economic. Historians are impressed with the church and religion, with government, liberty and democracy; or with industrialism, socialism, and reform according to the main concern of their epoch. More than in Shelley's time, life now is a "Dome of many-coloured glass," and so that interest of historians is more multifarious. The historian must have out his antennæ in every direction to catch the ebb and flow of things and let nothing important go by unheeded. He cannot safely take refuge in some cranny of his own lest what he sees and does be incomplete and disproportioned. This open-mindedness is especially incumbent upon writers of texts for they undertake to deal not with a phase of life but with life in all its leading phases. Now contemporary life in its leading phases includes radicalism and conservatism, socialism and individualism, reform and reaction, business and literature, art and penology, orthodoxy and liberalism, nationalism and disintegration, liberty and repression, education and illiteracy, migrations, repatriations, and settlements; ambitions and rivalries; progress and decay. Who is the historian who can catch all the discordant ensemble on his tympanum, separate fundamentals from over-tones, and render a just account of it all for other people, especially for boys and girls? Well, the job must be done as well as can be; else we shall be treated to a very imperfect, partial, and incomplete misrepresentation of our recent past; and while the older past contains matter of supreme importance to the living present, it is to the recent past that we turn most frequently for light upon the present,

for the cause of things, for the source of many little streams that run by our door. It retains what has preceded—eliminates something perhaps—adds its own considerable contribution, puts us in its debt—the measure of which debt it is the business of the historian to discover. In all this your healthy boy and girl has an interest, but not until the lines of connection have been revealed to him. He will not grub for them. His interest is in the visible world, but of this the past may become a part through enlisting his imagination and his emotions. Writer and teacher must lay bare the connections that arouse imagination and emotion to activity.

THE PLACE OF ANCIENT HISTORY IN THE HIGH SCHOOL CURRICULUM.

MISS ALICE VANDER VELDE, GRAND RAPIDS.

In pleading for a place for a year of ancient history in the high school curriculum, I am not asking that every child be required to take a year of Greek and Roman history, but that the subject be conceded its due importance.

Why provide the year of ancient history in the curriculum? Because it forms a natural foundation for the later courses. Surely in history the chronological is the logical order to be followed in a high school course, and the student who begins his study of later periods with no training in Greek and Roman history or with only a cursory view of the ancient nations misses more than one at first thought realizes. How can one explain satisfactorily the influence of Roman law upon French law or of Roman Imperialism on Otto I to a pupil to whom the Roman Empire is nothing but a patch of pink color on a map of the ancient world? Even more discouraging is the attempt to explain the phrase "Catholic Church" to a child to whom the influence of this same Empire upon the organization of the Christian Church means nothing.

In another sense besides the chronological, ancient history affords an introduction to later courses in that it strips the student of some of his prejudices and makes his attitude toward the people of other ages more tolerant. Most children of high school age are afflicted with a sort of provincialism of time that makes them look upon people of other ages with a contemptuous pity. This seems quite natural when one recalls how their grade school geographies and histories and children's magazines emphasize the wonders of this age of invention. To a high school freshman, an ancient Greek who never saw an aeroplane nor dreamed of killing his enemies in one tenth so scientific or effective a fashion as a modern warrior, is a poor

sort of creature and can hardly be blamed for believing that cloud-capped Olympus was peopled with miracle-working gods and goddesses. When he realizes, however, that these same myth-loving Greeks in their victory at Marathon actually influenced his life in determining the pictures he enjoys, the plays he sees, the house he lives in, the clothes he wears, his eyes are opened in some degree to the vastness and the unity of the world. As a freshman he is much more willing to have his eyes opened than he will be after a years' sophistication. When the first impulse to question the statement of his textbook has been satisfied, he is ready to respect the ancient Egyptians for engineering feats that are the despair of modern mechanical skill. The first year of high school seems to me the psychological moment for taking advantage of the spontaneity that a freshman so soon loses and utilizing it for the development of tolerance. Who but a freshman would be so personally interested in the plebeians of ancient Rome as to stop a friend in the hall with the announcement, "O Harriett! I've read ahead, and they do get the consulship after all."? The lack of self-consciousness that makes a child ask, "Well, why didn't all the democrats get together and make Sulla stop his prescriptions?" opens the way for pointing out the fact that even in this enlightened age, Democrats do not always get together so often or so advantageously as they might.

If history is to help the student to understand his environment, are we justified in choosing only those periods nearest in point of time as of most immediate importance? What could be more vital to an understanding of modern life than some knowledge of the origin of commerce, of the industrial arts, of government, of the church? In spite of the lapse of centuries is this not as fundamental as the campaigns of Napoleon or the unification of Italy? How meaningless much of one's reading would be without a training in ancient history. The exhibit of the classical department in Memorial Hall shows graphically the dependence of modern upon ancient thought. One would miss much of allusion if Euripides were but a name and Socrates an oft quoted ancient with a disagreeable wife. Would reference to an encyclopedia give the reader as clear an understanding as even an elementary study of Greek History?

A foundation in ancient history is almost indispensable to the pupil taking a classical course. This is especially true in the study of Cicero. Imagine the confusion in the mind of the student without training in ancient history, who reads in his introductory notes to Cicero's orations, references to the equestrian order, the proconsulship of Egypt, the senatorial oligarchy. He misses more than the mere definitions of such terms for a knowledge of the general conditions of Roman life is essential to the understanding of countless allusions in the orations.

But suppose the student forgets the bulk of facts and names he has learned—even then the course in ancient history is worth while. No later course affords quite so good an opportunity or satisfies so great a need for

discipline as this ninth grade course. All the students come to the work equally trained and equally spoiled. No textbook has been adopted for the eighth grade history course in Grand Rapids. Lessons in this course must consequently be assigned by topics, and the teacher cannot demand definite knowledge of a definite assignment. The pupil feels that if he is able to say something interesting which has even a remote bearing on the lesson, he is making a satisfactory recitation, and he flatters himself upon doing some very grown-up "reference work." Now in his ninth grade work he may be taught to study a definite lesson to get a definite knowledge of the work assigned. He must learn that it is well to know something about the matter under discussion before he begins to talk about it. This training in study has been made practicable in our Central High School by hour recitation periods, which are divided in the ninth grade into a half-hour of recitation and a half-hour of supervised study. The ground covered in ancient history is limited enough to afford an ideal opportunity for training the pupil in intensive study. He may be taught to find out exactly what a paragraph means. He may acquire a vocabulary, useful not only for the study of history but for general reading. Economical, political, constitution, democracy, oligarchy, industrial arts, and many words much simpler than these have only a very hazy meaning for the average freshman. One difficulty about the matter is that the very hazy idea is quite likely to satisfy him perfectly. He must be taught not to be satisfied until the meaning is clear.

Could this training in right habits of study be given as well in later courses? I doubt it. There is more difference in the previous training of pupils electing later courses, the ground they must cover is more extensive, and, besides, a year or more in which they might derive the benefits of their training would be lost.

Can we then, in view of the content of the course, with its intimate bearing upon all later history, and of the training it offers, afford to give up this year's study of Ancient History? Would not such a measure be a step in the direction of too much attention to the building of the superstructure of education and too little to the laying of a broad, deep, and durable foundation?

CONFERENCE OF PHYSICS AND CHEMISTRY

MODERN PROBLEMS IN PHYSICS AND CHEMISTRY CONFERENCE.

PROFESSOR K. E. GUTHE, UNIVERSITY OF MICHIGAN.

1. The best method of gaining a clear view of the present development of a science is to study its history. Only thus can we fully understand the growth of originally crude notions into well defined concepts or can follow along the path which our great leaders travel and may recognize the goal which they strive to reach by their painstaking investigations. Without such study our teaching may easily degenerate into a mere taking of an inventory of striking discoveries and of more or less important laws while the driving pinciple underlying progress will forever be obscured to our vision.

The history of Physics shows clearly a constant fluctuation between speculation and the collection of experimental data. Physics, in ancient times a purely speculative discipline, had to wrestle for centuries with superstition and dogmatic arrogance, until it finally became an experimental science. But do we not frequently lay too much stress upon the experimental achievements and forget that it is usually the imaginative physicist who has shown us the way to further progress?

We are all proud of the "established facts". They seem to be the only solid foundation upon which we may safely rear that grand structure, the theory of Physics. Many of our colleagues believe that our science consists of nothing but the experimentally proven laws, and that the speculations by which we try to give life to these laws, do not deserve to be taken seriously. Such an attitude is always predominant when a succession of brilliant theories seems to have solved all the important problems which natural phenomena present. Then these theories are believed in almost as implicitly as the experimental facts and any attack upon them is violently resented.

2. Such a condition existed in the closing years of the past century. The kinetic theory of gases had given us a definite picture of a swarm of molecules, flying hither and thither thru space, colliding and rebounding from one another. The first law of thermodynamics had given us an explanation of heat; the second law of thermodynamics had revealed the secrets of heat engines; the law of conservation of energy had shown the interrelation of different fields of Physics; and finally the electromagnetic theory of light had definitely disposed of the action at a distance theory for electricity and magnetism and of the theory of a solid elastic ether. A few outstanding discrepencies between theory and observations, among which the most formidable was the famous Michelson-Morley experiment, were confidently expected to disappear in the near future. It is no wonder that the physicists

at that time felt contented and devoted themselves to the task of carefully surveying and rendering useful the ground which had been won by such heroes as Mayer, Faraday, Maxwell, Clausius, Helmholtz, Hertz and Kelvin.

It was a time of enormous development in all branches of applied Physics. Think of the marvellous progress, made in the various branches of engineering, especially in electrical engineering with its telegraph, telephone, incandescent lamp, arc light and wireless telegraphy. It seemed almost as if the student of pure physics had no further duty but to teach future engineers the fundamentals of their profession, or, if bound to pursue research, to increase by painstaking observations the accuracy of determinations of physical quantities previously measured by less reliable methods. It was a time when Bureaus of Standards were founded in many countries and when the first research laboratories were established by various industries with the primary object to improve the manufactured product rather than to make fundamental discoveries. Do not let us underestimate the importance of this period. It has shown the value of the physicist to the industrial world, yea, to civilization in general, and I do not believe, the time will ever come when there will be a less demand for physicists who devote themselves to the solution of just such problems. Surely, these problems will change as our science advances, and they will always remain modern problems and require the services of our best men.

But it is not of these opportunities which present themselves to the physicist of which I wish to speak today. We have discussed them fully at our meeting two years ago. With a widening sphere of practical application new problems constantly arise and demand solution. Without underestimating their importance I shall restrict myself in this paper to an entirely different class of problems, namely to those which touch the very foundations of physical science. Let me draw your attention to the fact that in the last few years the pendulum has swung back and we have entered again in pure physics upon a period of speculation, a period which with regard to revolutionary ideas and destructive attacks upon time honored concepts has never been equaled before.

3. Experience has shown that our concepts must from time to time be overhauled and new guiding principles for their classification be found, especially so, after a large mass of experimental data has been accumulated. Then the time has arrived for the speculative scientist. This is exactly what happened again in the last few years. In 1892 Lenard showed the penetrating power of cathode rays, in 1895 Roentgen gave us the X-rays which in the following year led to the discovery of the Becquerel rays. At the same time Zeeman found the effect of a magnetic field upon a source of light, while Rubens and his collaborators isolated the Reststrahlen, extending greatly our knowledge of the invisible spectrum. Immediately after this the Curies separated polonium and radium from pitchblende, and in 1898 there appeared upon the scene the minute and yet so powerful electron. What a wealth of great discoveries are crowded into those few years and what an

incentive they gave to experimental investigations. Broad fields of new knowledge were opened and an enormous mass of new data procured.

Very soon it was clearly recognized that our existing system of fundamental concepts was inadequate to take care of the new ideas. The pigeon holes into which we used to shove the various physical phenomena and which we had just arranged in such a satisfactory manner and labeled "Explanations of the Physical World" became filled to overflowing and there was still plenty of material which did not fit into any of them.

4. The first thing to be subjected to a critical examination, was the poor atom, our faithful servant which during the past years had so willingly assumed the burden of explaining phenomena whose causes were unknown to us. It had developed an innate power of attracting other atoms at a distance when we considered gravitation; it became a perfectly elastic sphere, running helter-skelter thru space, when the kinetic theory of gases demanded it; it was kept busy conducting heat by receiving it from its neighbor and handing it on to the next; it obediently took charges of electricity upon its shoulders and carried them thru electrolytic solutions, but on the other hand resisted the passage of electricity in conductors when we wanted it to do so; it even set the ether into vibrations when we needed light..

Our new ideas have entirely transformed the atom, and there is little left of its old solid, comfortable and rotund form. It is true that for some years J. J. Thomson (1904) tried to preserve this form by assuming that it was a sphere of uniformly distributed positive electricity, containing rings of electrons revolving in its interior. This was somewhat modified by H. A. Wilson in 1911. But more recent investigations, especially those by Rutherford and his school, have shown that it must consist of a positive nucleus of extremely small dimensions, in fact much smaller than its other parts, namely the electrons which move about it as the planets do about the sun. In comparison with the sizes of the nucleus and the electrons the distances between them are very great. This new interesting structure is called the "Saturnian Atom", a name originally proposed by Nagaoka as early as 1904. The general acceptance of this form of atom is due to the fact that it alone seems to be able to produce a scattering of α particles in agreement with results obtained by many investigators. Indeed the large amount of information gained by the study of the passage of radiation from radioactive bodies and of X-rays thru solid bodies strengthens our belief that the atom must be a rather empty thing, as far as the presence of ordinary matter is concerned, tho it must be the seat of a very intense electric field.

But the problem for the modern physicist is much broader than merely that of discovering the structure of the atom, because, just as its predecessor, our new atom has some definite duties to perform. For example, it must be a stable structure and yet radiate energy into space. It is an extremely difficult problem to show how the nucleus and its accompanying electrons might be arranged and what their motion might be to insure such stability. Nicholson and the young Danish mathematician Bohr have attacked this

question with a certain degree of success. The work of the latter is especially noteworthy, since he has been able to calculate, at least for the lighter atoms, hydrogen and helium, the wave length of their spectral lines. However in order to do so, he was forced to assume that an electron does not radiate energy when it is in a steady orbital motion about the nucleus, but that it radiates only when it changes its motion from one stable state to another, equally stable. Unfortunately this assumption is entirely contrary to the laws of classical electrodynamics and to the usual explanation of the Zeeman effect. In fact, it seems that these laws must be supplemented or considerably modified when we deal with the moving electron.

One of the most remarkable achievements of recent date is the solution of the problem as to the nature of the X-rays. Barkla observed in 1909 that easily recognized, homogeneous X-ray radiation could be obtained from a body which was bombarded by cathode rays of definite energy or by other X-rays. These rays were characteristic of the substance from which they proceeded and are now called the characteristic X-rays. Without stopping to explain the different theories, let me say that the diffraction experiments of Laue, Friedrich and Knipping and the reflection experiments of Professor Bragg and his son, have now proved definitely that X-rays are of the same nature as light waves, but extremely short, namely only about 10^{-8} cm in length, i. e. of a length comparable with atomic dimensions. What a step in advance this is. The shortest light waves, heretofore observed in the ultraviolent spectrum, are 0.1 μ or 10^{-5} cm in lengh, and now we know some whose wave length is less than one one thousandth of this value. As the last twenty years have witnessed the constant filling out of the gap between the electric waves and the infrared rays, until there is left now only the short distance between 3 mm and 0.4 mm, so we may hope that the time is not far distant when we know the complete spectrum from a wave length of 10^{-9} cm to that of thousands of kilometers.

5. The problem is no longer: "What is the nature of the X-rays"? but "To what further advance in our knowledge will they lead?" Indeed, two new broad fields of research have been opened to us in the last two years. In the first place we are now able to get a fairly clear insight into the structure of crystals and can determine just how the atoms and molecules are arranged in a given crystal and can even measure their average distance apart. It is especially the younger Bragg who has energetically pushed forward into this new field of physical crystallography.

But these investigations have shed much light also in another, entirely unexpected direction. Mosely has measured the wave lengths of the characteristic X-rays from nearly all elements and has found that they are closely connected with the atomic weights. He showed that the frequencies can be expressed by the simple formula: $n = A\ (N - B)^2$, where A and B are constants for the given series of characteristic X-rays, and N forms the series of whole numbers, 1, 2, 3, etc., increasing by unity as we pass from a given element to the next in the order of increasing atomic

weight. You know that no such regularity can be found in the series of atomic weights, but here we have a remarkable simplicity which has long been looked for by our friends, the chemists. Moreover, only three numbers are missing as we pass from Aluminium to Gold, indicating that there are only three more unknown elements in the whole series. These numbers, *N*, so characteristic of the different elements, are called "Atomic Numbers", hydrogen nucleus is therefore the long searched for positive elementary charges on the nucleus of the atom. They are nearly equal to one half the atomic weights. We can now form a picture of the hydrogen atom as a single positive charge on a sphere not larger than 10^{-13} cm in diameter and at some distance from it, namely 10^{-8} cm the corresponding electron. The hydrogen nucleus is therefore the long searched for elementary positive charge. The helium atom consists of a nucleus of double positive charge and two electrons. The atom of gold with the atomic number 79 must have a very complicated structure.

"The ultimate character and eternal existence of the elements can no longer be upheld." It is true that Prout's hypothesis is dead, beyond the hope of ever being revived; but have we not here a very satisfactory substitute? Remove a positive charge from the nucleus of a given atom and you get the atom of the next element of lower atomic weight, add one positive charge and you get the atom of next higher atomic weight. Remove an α particle and you have an atom removed from the original by 2 steps; remove β particle, and the element makes one step up in the atomic number. Radioactive phenomena have by this time made us acquainted with the possibility of transformation of one element into another. An enormous amount of work is being done and remains to be done in this field. Rutherford, the most eminent investigator in this line, is just now applying with marked success Moseley's results to the various products of the radium series. As far as a radioactive phenomena are concerned we are still only interested spectators, wondering by what tricks nature changes one element into another, but many investigators hope to find the secret formula which will enable them to produce such transformations themselves.

6. Next to the atom the electron is receiving marked attention from the physicists. We now generally believe in the molecular structure of electricity, a hypothesis, formerly only dimly suggested by the theory of electrolysis. It is the electron which appears as the all important factor in electrical as well as thermal conduction; it is the source of radiation, it plays an important role in the reflection and refraction of light; it forms the connecting link between ponderable matter and electromagnetic space. When it was announced 16 years ago that the mass of the electron is only the 1/1700th part of that of the hydrogen atom, many people were troubled and could not interpret the meaning of this. However, it is now generally admitted that the mass of the electron is purely an inertia effect, an electromagnetic mass, if you please, clearly distinguished from gravitational mass, which in the atom seems to be concentrated in the minute nucleus with its

intense electric field. Where will all this speculation lead us, this speculation which is, however, supported by experimental data? Is mass nothing else but an attribute of electric charges distributed inside or on the surface of minute portions of space? And if so, what is the cause that transforms the inertia mass into gravitational mass?

7. After all, you might say, the new physics is distinguished from the old only by its tendency of going more into detail and it should not be difficult to adjust ourselves to the new conditions. But this can hardly be said of two new theories which at the present hold the center of the stage, the relativity principle and the quantum theory. They are as wide as the whole domain of physics and are revolutionary in their fundamental concepts. They have been originated and developed in Germany, while the beautiful, detailed work, just described, is mainly the achievement of English and French scientists.

Maxwell's famous theory gave us the electromagnetic ether, but the theory "was designed only for a medium at rest or for a practically stationary medium." As soon as Michelson and Morley tested it for the determination of the speed of the earth thru space, it was found insufficient. The result was a period of bewilderment." Fortunately the electron appeared and offered assistance. For the first time in the history of physics we had at our disposal bodies with speeds approximating that of light. These swift electric charges seemed to have no regard for Newton's laws and, as Barus puts it, "swept the classical dynamics mercilessly out of the field." Not alone are they devoid of matter, but their mass increases with their velocity. Lorentz and Larmor attacked the problem of the electrodynamics of a moving medium, but their method of solution seemed not entirely satisfactory to all. It is Einstein who in 1905 has found a way out of the labyrinth. He gave us the principle of relativity, an extension of the well known old dogma that all motion is relative. In whatever form you may present the new theory, its conclusions are startling.

If two events separated in space occur simultaneously to one observer, this need not be the cause of another observer moving with a velocity different from that of the first. Identical clocks in two different systems will go at different rates depending on the relative velocity of the two systems. The mass of any given body is no longer a constant, but increases with its velocity and the mass of a body moving parallel to the observer's motion is different from its mass if moving at right angles to it. Newton's Mechanics is only a first approximation to the truth. The speed of light in free space is the same in all systems, moving or at rest; and to mention just one more conclusion: The ether may not exist at all, it is a hallucination, one of those useful hypothetical substances which must give way when no longer needed.

This theory is by no means absurd, its mathematical conclusions are in remarkable agreement with such experimental observations as allow a test. Encouraged by its success its adherents have now attacked the time-honored

problem of gravitation, and Einstein has very recently shown as one of its consequences that in space the speed of light decreases with increasing gravitational potential. From a mathematician's point of view the theory appears very attractive, but many physicists feel that it is rather mathematical than physical speculation, tho we must confess that "it is at present the only way out of a desperate situation".

8. The second important new theory is known as the quantum theory. It was first suggested by Planck in 1900 when he derived his famous law of radiation. He made the assumption that energy was not emitted continuously, but in exact multiples of *hn,* where *n* is the frequency of radiation and *h* a universal constant. The constant is now called the "Wirkungsquantum" or "Planck's Constant". ($h = 6.55 \times 10^{-27}$ erg-seconds). It is remarkable how during the last few years this constant has appeared again and again in widely separated fields of physics. We find it in the photo-electric effect, in Bohr's theory of electronic radiation, in the characteristic X-rays, in the atomic heat of elements and in the residual energy at low temperatures. Nernst has made use of it with great success in all sort of problems about specific heat and vapor tension. It would be too much to say that energy has been shown to have an atomic structure, but it seems fairly well established that under certain conditions energy appears in definite, well defined and separate small quantities. This energy element has been called "a saucy reality whose purpose is to stay". To quote Eve:—"This quantum hypothesis has spread like fire during a drought. It pervades the scientific journals. No physicist has pretended to explain or understand it, for, as Jeans says, the lucky guess has not yet been made."

9. But I must close. I could only touch the most prominent features of modern physics. We do no longer rest contented with the knowledge that there appear in our formulae certain characteristic constants, such as the constant of gravitation, specific heat, electrical resistance, etc.; but we are beginning to ask: "What is their nature"? These constants have formerly been merely names without deeper meaning. They were words enabling us to speak the language of physics a little more fluently, and the laws containing them were only attempts to put these words together so as to form simple sentences in this language. Many teachers make the serious blunder of requiring the beginner to memorize laws without clearly showing the meaning of each word. Others again put too much stress on definitions. A book on definitions is the dictionary of the language of physics. We cannot get along without a correct dictionary, but no one would willingly learn a new language by memorizing a dictionary.

The old physics has not gone far beyond putting together words into simple sentences; it has taught us to master the first reader, or possibly elementary composition. We are only now opening the book of poetry and wonder tales of nature; and even if we cannot yet grasp in its entirety the beauty and deeper meaning of the stories, we hope confidently that with

further study they will become increasingly more interesting and inspiring. Is it not true what Longfellow said in one of his poems:

And Nature, the old nurse, took
  The child upon her knee,
Saying: "Here is a story-book
  Thy Father has written for thee."

"Come, wander with me", she said,
  "Into regions yet untrod;
And read what is still unread
  In the manuscripts of God".

And he wandered away and away
  With Nature, the dear old nurse,
Who sang to him night and day
  The rhymes of the universe.

And whenever the way seemed long,
  Or his heart began to fail,
She would sing a more wonderful song,
  Or tell a more marvellous tale.

MATHEMATICAL CONFERENCE

MATHEMATICAL CONFERENCE.

REPORT OF SECRETARY E. F. GEE, DETROIT CENTRAL.

About eighty-five teachers of mathematics and allied sciences were present at the mathematics luncheon of the Michigan Schoolmasters' Club. It is proposed to make the luncheon an annual affair, as it served to enable all to get acquainted and to exchange experiences in private conversation. The papers at this session were devoted entirely to practical phases of the teaching of high school mathematics. Correlation and real problems occupied a prominent place in the discussion.

Particular interest was aroused by the description by Mr. Keal of the continuation work in the Cass Technical High School of Detroit. A number of factories in Detroit are paying their men full time for two or more afternoons per week, put in on applied school work in this high school. Miss Mary Welton, of Grand Rapids, had an exhibit of drawings, in connection with practical geometry. Not only was mechanical drawing emphasized, but

also perspective work in black and white, to illustrate the theorems of solid geometry.

Mr. R. M. Sprague, of Toledo, gave an interesting account of the work being done with "over-size" boys in the Toledo schools. By correlation with manual training and practical work these boys make rapid progress in arithmetic and elementary algebra, in the seventh and eighth grades. In this way a majority go on into the high school proper.

At the following meeting, next April, it is proposed to continue the discussion of real problems in high school work, and also to discuss the relation of the various phases of higher mathematics to the elementary mathematics.

PRACTICAL PROBLEMS IN HIGH SCHOOL MATHEMATICS.

MR. S. A. COURTIS, DETROIT.

I want to use the time alloted to me this afternoon for a protest against the use of such practical problems as are found in some of the modern text books and in the work of some teachers. The basis of my objection is suggested by a question frequently asked by Prof. Strayer, of Teachers' College, "practical for whom"? I contend that practical problems must be of practical value to the child before they are worthy of the name.

The accepted definition of a practical problem seems to be "one whose content deals with a concrete situation in daily life as opposed to the artificial text book problem." The basis of this idea is a good one, and I do not want to be understood as opposing in any way the attempt to secure a greater degree of interest on the part of the pupil in the subject he is studying. Correlation of subject matter with daily life is to be desired, wherever the same is possible on any basis. My only quarrel is with the way in which this correlation is attempted.

For instance, in one of the widely used text books I find this statement, "By far the most important problems are those which it is necessary for mankind to solve in order to gain certain desired information. Such problems are called real problems or practical problems." By way of illustration, this problem is given: "The Earth and Mars were in conjunction. When are they next in conjunction if the Earth's period is 365 days and that of Mars 687 days"?

I do not believe that this is a real problem even by the definition given by the text book. In the first place, at best it is a very rough presentation of the complicated problem an astronomer would need to solve if he were interested in this question. In the second place, I do not believe the problem occurs in astronomical experience in this form, and as far as the child is concerned the problem is an impractical problem. It demands of the child

a certain amount of astronomical experience which he is not likely to have had, and if the algebra teacher takes the time to make the necessary explanation as to what conjunction and period mean, he can at best give but a very imperfect idea of the situation and one that will fail to present the situation to the child in such a way that he will have any feeling for the problem as a *real* problem to him.

This same text book says further: "Still other problems, while mere puzzles, are of value because they deal with important scientific and mechanical data." By way of illustration the following problem is selected: "The melting temperature of glass is 276 degrees (centigrade) higher than twice that of zinc. One half the number of degrees at which glass melts plus 7 times the number at which zinc melts equals, 3,434. Find the melting point of zinc." I should like to raise the question as to whether it is a function of the algebra class to teach important scientific data. I suggest that the formulation of a problem in terms of melting temperature of glass and zinc merely serve to confuse the child without in the least adding to his power or information. I contend that the customary statement of the problem "one number is 276 more than twice another," etc., is better form for giving the training which a class in algebra is intended to give than when disguised in scientific terms.

A problem of a little better type is taken from one of our recent geometries—"If it is customary in iron turning to allow a cutting speed at the rim of 40 feet per minute, at what speed (revolutions per minute) should a lathe be driven for a piece of iron 2″ in diameter? Such a problem is much more a real problem, but in my judgment it is a vocational problem and out of place in the ordinary high school class in geometry. For children who have had experience with lathes it is a logical problem, but it is impossible to transmit experience by mere words and any explanation the geometry teacher might make is inadequate to develop a true appreciation of the problem involved.

A still higher type of problem is the following: "From each of the four corners of a square sheet of tin a small square was cut and the four rectangular strips thus made were turned up to form a square cornered box. If the box proved to be cubical, of 27 cubic inches capacity, what were the dimensions of the original sheet of tin"? But even this I would criticise, because the child may not have had sufficient experience with boxes and the construction of boxes to interpret the problem as he should. I would suggest that the better way to handle the question of real problems would, in this case, be something as follows: The teacher would have ready a cardboard box constructed as outlined in the problem; he would also have a graduate marked in cubic inches and filled with dry sand. Some member of the class would be asked to determine the capacity of the box by pouring the sand from the graduate into the box until it was full. This would give the capacity 27 cubic inches as a direct result of the child's own action, so

that it would be fully understood. Another member of the class would then take the empty box, slit the four corners and flatten it out. The question could then be raised as to the dimensions of the original sheet of cardboard from which the box was made. When this has been successfully solved a number of similar problems, giving a variation of the same idea, should be formulated by the class themselves and solved. In other words, a problem to be real should rise out of the action of the children and should involve the use of their mathematics as a tool. Only under these conditions is a problem a real problem or a problem that is practical for the child. An ingenious teacher will find many such situations as soon as she begins to look for them.

Geometry offers a large field for problems in algebra and vice versa. Try the following on your classes:

1. Draw a 2 inch circle and a tangent to the circle 2½ inches long.

2. Draw a 2 inch square. On each corner as a center, draw a circle using such a radius that the circles drawn shall be tangent to each other. Find the area of the figure formed. Derive a formula for finding the area of such a figure in terms of the radius of the circle.

3. Draw two supplementary adjacent angles, such that one is 15 degrees more than twice the other. Bisect each angle. What relation do the bisectors seem to bear to each other? State your conclusions in the form of a theorem and prove it.

If you attempt such practical problems, however, you will soon raise two very important objections. You will discover that the children have so little power that practical problems will take a great deal of time, and in the second place you will also discover that the mathematics involved in such problems will be very simple. It seems to me, however, that these objections throw a great deal of light upon the present teaching of High School mathematics. Are we not giving children in the High School courses in algebra very much more juggling of symbols than we should? Would it not be better to do a few things so well that the children would develop a better power to use their knowledge than to try to cover so many topics and to do it in such a superficial way? As I see it, the real function of algebra in the curriculum is not for the purpose of giving children a certain knowledge about algebra, but to develop a conscious method and power to make generalizations. In similar fashion the function of geometry is to develop the power of seeing the logical relations involved in the various steps in the solution of the problems.

My thesis is that the problem is practical for the child only as it serves these functions and the criteria that I suggest be adopted for determining whether or not a problem is practical are two—does it involve the manipulation of concrete material on the part of the child, and in the course of that manipulation does he use his mathematics as a tool?

SOME OBSERVATIONS CONCERNING THE TEACHING OF HIGH SCHOOL ALGEBRA.

PROFESSOR E. ROSCOE SLEIGHT, ALBION COLLEGE.

The expression, "Well begun is half done", is applicable in a large measure to the study of Mathematics, since the failure or success of a student usually begins with his introduction to Elementary Algebra. This fact is brought to my attention each year. In Albion we have found that progress is made by giving a review of the essential parts of the elements of Algebra before beginning College Algebra. This review is followed by an examination, and all students failing to pass, either drop the subject or continue conditionally. This condition must be removed before credit is given in the first course in College Mathematics. As a result of these reviews and examinations, I have made some deductions which I shall endeavor to present in this paper.

For several years we have heard much concerning better prepared teachers of Mathematics. It appeals to me that this is the all important necessity for better prepared students. The sooner that colleges and universities realize this and recommend only such as have had sufficient training, the sooner the whole question concerning failures in College Mathematics will be settled. The student preparing to teach should not be content merely to take those courses that are necessary, but rather she ought to be anxious to make the best preparation possible. Many suggestions have been made concerning desirable courses. We all would include College Algebra, Trigonometry, Analytic Geometry, and Calculus. To these I would add Theory of Equations, Theory of Determinants, History of Mathematics, and Modern Geometry, both Analytic and Synthetic. The well prepared teacher ought to know something about the application of Mathematics to such subjects as Surveying, Descriptive Geometry, Physics and Astronomy. In addition to the academic training provision should be made for as much training as possible in methods of presenting the subject. Courses in the teaching of Algebra and Geometry might be offered. In every college there are students who have not met the entrance requirements in Mathematics. These can be organized into a class and used for the benefit of the seniors who are preparing to teach.

This preparation may seem excessive, yet more and more is it being demanded. When the present subjects were introduced into the High School course much discussion resulted. But now we hear the murmurings of the introduction of Calculus and Analytic Geometry. If the time comes that these subjects become a part of the curriculum, then not only will this preparation be desirable but also necessary. Then too the teacher needs this broad outlook to be able to select the subject matter that will lead to the

best results. Also the interest of the boy or girl can best be aroused by one who knows the application of the subject being studied.

But with all this preparation a teacher may fail in presenting the subject. One of the causes of failure lies in the fact that proper relations can not be established between the known and the unknown,—in most cases between the Arithmetic and the Algebra. In a recent investigation in the schools of Chicago it was found that Arithmetic was well taught in the grades, yet the High School teachers complained that the pupils were not prepared for the Algebra. The committee on investigation decided that the fault was not in the preparation, but rather the teachers of Algebra failed to establish the proper relations between the operations of Algebra and the operations of Arithmetic. The successful teacher of Algebra will lead the pupil to see that Algebra is nothing more than generalized Arithmetic. If the point of contact can be established between these two subjects, then many of the common errors can be avoided.

It is felt by many that the beginner is not prepared to understand the the reasons for the operations of Algebra. It is not well to insist upon a rigorous proof for each step, yet devices may be used that will lead the pupil to understand why each operation is possible. The axioms and their applications to equations can be presented in a simple manner, and their use ought to be insisted upon rather than the use of such expressions as clearing of fractions, transposing, canceling, etc. The whole system of positive and negative numbers can well be illustrated by the use of the thermometer, considering heat as positive and cold as negative. In many cases the pupil is told to simplify a complex expression. He performs the indicated operations, obtains the answer, yet does not realize that he has obtained a simplier form. This is well illustrated in the simplification of surds.

The teacher of Elementary Algebra, in her desire to omit nothing important, usually goes to the other extreme and teaches too much. In a sense she is justified in this, for the text books vie with each other in the amount of material contained. Many of the traditional subjects might well be omitted, such as complicated cases of factoring and finding the Greatest Common Divisor of Polynomials of degree higher than the third. In treating the signs of aggregation we rarely find, outside of the text book, problems that involve more than one set of such signs within another. Then why spend so much time upon this particular class of problems? The same might be said of complicated problems in factoring, in fractions, and nearly every subject presented in Elementary Algebra. Again much time is lost in teaching several methods for the solution of the same class of problems. One method well learned for completing the square is sufficient. Simultaneous Quadratics is another case in which many methods are taught. In every class of problems a general method for solution should be taught, leaving the discovery of short cuts and special devices to the pupil. He gains by the discovery of these special methods but the knowledge of them taught by the teacher means nothing.

We are told that factoring is the back-bone of Algebra. Yet much poor teaching is done in connection with this subject. One of the reasons lies in the fact that too much is attempted and too little time is spent on the essential cases. Much of the teaching concerning factoring either is not useful or is not altogether true. We say that the sum of two squares can not be factored, failing to distinguish between rational and irrational factors. I do not advocate the introduction of irrational factors but rather an introduction of a more exact statement of the truth. Then accepting the statement that is usually understood concerning the factoring of two squares, it is true only if the exponent is 2 or a power of 2. Thus we see that a more exact statement of the truth might lead to better results. Much time is spent in trying to teach that $A^n \pm B^n$ is divisible by $A \pm B$ under certain conditions. This statement is perfectly true, but unless n is a prime number of what use is this statement of the case as an aid in factoring? In an elementary course n might well be limited to include only the values 2 to 3.

To conclude then, I would suggest that the teacher of Mathematics have sufficient training, both in regard to the number of courses taken and in regard to the methods of presenting the subjects required. In regard to the actual work of the class-room I would make the following suggestions:

1. Use the inductive method of passing from the Arithmetic to the Algebra and from the simple of Algebra to the complex.
2. As far as possible require reasons for operations.
3. Omit all theory that can not be readily understood by the pupil.
4. Importance should be given to such topics as may be used in the future.
5. Omit complicated processes and complicated problems.
6. Teach general methods, leaving short cuts to the pupil.
7. Drill on the essentials.

CORRELATION OF ARITHMETIC AND ALGEBRA.

BY MR. M. O. TRIPP, OLIVET COLLEGE.

One of the difficult questions which the teacher of beginning algebra confronts is that of making algebra more concrete, and at the same time vitally connected with the work in arithmetic which the student has had in the grades. If algebra is to be taught in the grades it should be very largely the algebra of formulae, and hence a close adjunct to the regular work in arithmetic.

In beginning high school work great attention should be paid to checking or testing all results by the substitution of definite numbers for the various letters involved. When it is a question of reducing problems to

equations, the result obtained should be tested not merely as the root of the equation involved, but also as a number which must satisfy the conditions imposed by the problem. In this way the change from arithmetic to algebra will not be so abrupt.

The success of a teacher depends, to a large extent, upon his ability to illustrate the algebraic work by examples that come within the experience of the student. I wish to suggest a number of illustrations which will help in making close contact between arithmetic and algebra in the minds of the pupils.

Subtraction of polynomials may be used to prove the rule of arithmetic that if the order of digits of a number be reversed and then the two numbers subtracted the difference is divisible by 9. Thus if the number, say of two digits, be represented by $10x + y$, then the number with the digits reversed will be $10y + x$; and hence the difference will be $9x - 9y$, a result which is evidently divisible by 9. If we take a number of three digits and reverse the order the difference between the number and the number with its order of digits reversed will be divisible by 99. The student can readily derive a rule for determining when the difference will be divisible by 9, and when it will be divisible by 9 times 11.

Under special products in multiplication it is interesting to derive triples of Pythagorean numbers, that is rational numbers which may represent the three sides of a right triangle, by means of the identity:

$$(a^2 + b^2)^2 = (a^2 - b^2)^2 + (2ab)^2$$

Here we take $(a^2 + b^2)$ as the hypothenuse, and the numbers $(a^2 - b^2)$ and $2ab$ as the two sides about the right angle. Thus, if in the above identity, we take $a = 2$, $b = 1$, we get the triple 3, 4, 5.

By putting together Pythagorean right triangles having a common side we may find triples of Heronian numbers, that is, numbers representing the sides of a plane triangle such that the area shall be rational. Thus, by putting together the two Pythagorean triples 12, 9, 15, and 12, 5, 13, we get the Heronian triple 13, 14, 15. Teachers will find long lists of these Pythagorean and Heronian triples in Halsted's Mensuration (Ginn & Co.).

The identity

$$a^2 = (a + b)\ (a - b) + b^2$$

may be used to square small numbers. By its use the student can square numbers up to 100 mentally. Thus

$$25^2 = (25+5)\ (25 - 5) + 5^2 = (30)\ (20) + 5^2 = 625.$$

Under division of polynomials we may derive the tests for the divisibility of numbers. Thus, to test a number of three digits for divisibility by 3 we have

$$\frac{100x + 10y + z}{3} = 33x + 3y + \frac{x + y + z}{3}$$

from which it is evident that a number of three digits is divisible by 3 when the sum of its digits is divisible by 3.

As an application of simple equations let us express a repeating decimal as a common fraction. For example, let $x = .25\ 25\ 25\ \ldots$, then $100\,x = 25.\ 25\ 25\ 25\ \ldots$ Hence by subtraction we have

$$99\,x = 25,$$
$$\text{or } x = \frac{25}{99}$$

These illustrations, it is hoped, may be a means of stimulating teachers to think out more material to vitalize the teaching of beginning algebra.

BIOLOGICAL CONFERENCE

ELEMENTARY SCIENCE IN THE HIGH SCHOOL.

PROFESSOR LE ROY H. HARVEY, WESTERN STATE NORMAL.

In the recent widespread attacks upon Secondary Education, science has come in for her proportional criticism. This reaction against present methods and materials in our High School instruction is sourced in the feeling that the "People's College" has failed to equip its graduates for life. The dominance of commercialism, the public cry for the practical, the widespread introduction of vocational training and guidance, the dictation of college and university in regard to the course of study have resulted in placing secondary education under fire. The Natural Educational Association has recognized the significance of this public demand by the appointment in 1911 of a Commission on The Reorganization of Secondary Education, which in 1912-1913 appointed twelve sub-committees to investigate the various subjects of the High School Curriculum and present recommendations as a result of their investigations. The Committee on Natural Science with William Orr, deputy state commissioner of education of Massachussetts, as chairman was divided into 5 sub-committees, viz., (1) Introductory first year or general science, (2) Physics, (3) Chemistry, (4) Geography, (5) Biology.

The report which I desire to present for your consideration and criticism today is that of the Biology sub-committee of which James E. Peabody of the Morris High School of New York City is chairman. Early in the deliberations of this committee it became more and more apparent that we were dealing with a general problem which centered in the 9th and 10th grades and not with the special sciences coming under the heading of Biology. The feeling that this problem of elementary science was one of general and

not of split interest has led to this joint session of the Science Conferences of the Michigan Schoolmaster club today. It appears that the entire question of secondary science hangs in the balance with the solution of the problem of science work in the first two years of the High School.

General Science. The Sub-committee on first year introductory science of which Prof. John F. W. Woodhull of Columbia University is chairman has formulated "Some Fundamental Principles" ten in number which they contend argue for the organization of the first years science as a series of separate projects whose organization "depends on the skill of the teacher and the enthusiasm of the class," such a course is typified by the several recent General Science or First Year Science books.

General Science is designated as a one year course whose content is based upon the student's interest. "Any question that any one asks concerning the phenomena of nature and life is a legitimate basis for a project." It is essentially the Nature Study Method. It is the Mark Hopkins Method, but fails to recognize that there is not one but 24 other students at the other end of the log. It places the "evanescent interest and momentary fascination" of the student above the judgment of his instructor. Dr. Bagley says, "Interest in education must always be looked upon as a means to an end, the moment it is permitted to become an end in itself, the work of education becomes formless and its materials chaotic."

Such a principle of organization disregards any natural unit of classification and selects its material without restraint—"a little child shall lead them." Admitting such a contention it would be logical to argue segregation of adolescent youth for its science instruction—certainly no one would contend identity of interests. Also it would appear to be quite unjust to force the special interests of any child upon the group as a whole. It is evident that the project method if logically carried out will result in absolute incoherent heterogenity of materials. The only escape is that the instructor force upon the class the majority of the projects studied—in the books presented they are thus all superinforced—and the initial interest is thus sourced in the teacher, a rejection of their fundamental contention.

We contend that the project method of teaching science as outlined by the chairman of the General Science Committee at the recent N. E. A. Meeting at Cincinnati is indefensible as a basis of organization:

1. Because it neglects the psychology of early adolescence and fails to utilize what Dr. Dewey calls the requirement of "psychological organization" and which Dr. Hall terms "genetic organization," that is it fails to appreciate and utilize the dominant fact of early puberty, viz., the impulse of ideas. The child is now ready and seeks to organize the knowledge he acquires.

2. Because this type of course furnishes the student with discreet portions of knowledge which may satisfy his evanescent curiosity, but fails thru its lack of unity to leave any underlying principles in the childs mind. It relegates the organization of science and so discards our best social heri-

tage, our knowledge of underlying fundamental truths. But for such our relations to nature would continue scarcely more effective than that in savagery. Man's classification of nature is not only an index of his knowledge but the fundamental principles back of this classification serve as his guide in thinking and conduct. We contend that we should transmit this social heritage of scientific knowledge in its most understandable and useful form—viz., as underlying prnciples or at least use them as the basis of our organization of content at the earliest possible period, and psyhologists tell us that early adolescense is the appointed time.

3. Because such a course is essentially encyclopedic. Its emphasis is first and lasts on facts rather than upon a comprehensive grasp of subject matter and an effective attitude of mind toward problems, an attitude which persists when unrelated facts are forgotten. It is in essence the nature study method whose economical utilization as an educational motive appears to cease with adolescence.

THE BIOLOGY REPORT RECOGNIZES:

1. That in the past there has been failure to articulate vitally with the students environment, that the relation to human welfare has not occupied a sufficiently prominent place in our science courses.

2. That elementary science should be taught in the interest of the child, the future citizen, and not for the welfare of the science.

3. That the inculcation of the scientific attitude of mind is equally if not even more important than the accumulation of certain facts and the explanation of certain phenomena.

4. That the psychological age of the child must play a determining influence in the organization of any course of study.

5. That the use of projects in teaching is not only pedagogically sound, but highly efficient.

6. That the experience of the last 25 years in science teaching has shown much of worth, and strives to preserve this while meeting the demands and needs of the present.

ELEMENTARY SCIENCE: In presenting a plan of organization the Biology committee finds itself in fair agreement with the General Science committee in the matter of the aims of science, in the materials of its content and even partially in method of presentation. As to the basis of organization it departs radically. The Biology Committee "maintains that *unity* of *subject matter* in any course of science is of first importance, by which is meant that the subject matter should be so organized that appreciation of *underlying principles* should form the foundation of the student's knowledge, thus giving him a scientific basis for the organization of his knowledge." Dr. John M. Coulter says: "A division of the materials of science seems necessary not only to secure competent teaching, which is a practical reason, but

also to secure a point of view that represents the permanent possession, which is the essential feature of education. This does not mean organization for the sake of the subject, but for the sake of a pupil; an organization which means a structure which abides, and not incoherent building material."

"The committee unanimously agree that a course in elementary science should include a study of the physical environment of living things; and a consideration of plants, animals, and man as living organisms; and that throughout the course constant reference should be made to the application of science to human welfare and convenience."

PLAN OF COURSE. The Biology Committee unanimously agrees that *two years of work in elementary scence* should be the basis for more advanced courses in science. These first two years would serve as a stem course from which the more specialized elective course of the upper two years would naturally diverge. Such a course would retain the natural divisions of science, holding them to be effective educational units in the interest of the child and in the interest of highest efficiency in teaching.

The committee recommend the organization of the stem-course in four semester units as follows: (1) Physical environment, (2) plants, (3) animals, and (4) man.

*FIRST HALF-YEAR.** "*Physical environment basic.* The physical controls of life. Physicists and physiographers have a joint interest in the content of this unit, which has been described as "general science with the biological part omitted." This first half-year unit, constitutes a sort of "setting of the stage" for the basic studies of life which are to follow. The relations of physical phenomena to life are used as illustrative, or as vitalizing material, but this does not lead into the study of vital phenomena as basic.

"Success in this and in the following units depends very much upon good judgment as to restraint of treatment, and such purgment depends upon appreciation of the use of a topic as basic as compared with its use as illustrative. The illustrative material may reasonably occupy the major share of attention as measured by time, but the basic material always has primacy when it comes to emphasis and reiteration. Thus, for example, attention is called in this unit to the facts that light and water and oxygen and the soil have fundamental relationships to plant and animal life, but these relationships are not analyzed in any detail, such as is involved in the study of microscopic structures. Such analysis is reserved for later units.

"Water and soil, air, light, and heat, and the great laws and phenomena which are related to them, form the basic topics. The earth in its relation to other heavenly bodies should also be considered.

"As illustrative, there is abundant citation of the relations of the basic materials to human welfare and convenience. This means the inclusion of

* The discussion of these four units is from John G. Coulter's article

much now put into general science courses under the head of "explanations of familiar things."

SECOND HALF-YEAR. "Plants. A study of plant life in general and of the uses of plants to man, with abundant illustrative use of economic plants, and of practices in plant culture. Three distinct advantages appear in thus directly following the physical environment unit by the plant unit.

1. "The gentic advantage. In the first unit we consider matter and forces which are prehistoric to plants. To these phenomena life had to adjust itself; within them life found its limits as well as the essentials of its being. From the genetic standpoint, then, our first unit obviously should be first. Likewise from this standpoint, the plant unit obviously comes second, for plants are prehistoric to animals, and are themselves one of the controlling conditions of animal life.

2. "The seasonal advantage. In all cases of regular or yearly promotions this arrangement brings the plant studies into the half-year which begins in the winter and ends when school is out. If plant studies are to be limited to a half-year, as obviously they must be in a general course, the reasons for placing them in the spring-term far out-weigh the reasons for placing them in the fall. And similarly, the advantages of having animal studies in the fall rather than in the spring are quite obvious to all students of zoology. (Availability of material is a principal point, but not the only point, in determining the arrangement indicated).

3. "The pedagogical advantages. Plants are far more directly and obviously controlled by the physical factors of environment than are animals. Study of air and light, of water and soil, and of changes in the earth's surface lead directly to the study of plants, which are themselves such large factors in determining changes in the earth's surface. The study of topography cannot be disassociated from the study of the plant-covering of the earth.

"Plants, better than animals, lend themselves to the first teachings of life processes, and strongly illuminate the study of animals which follows.

"In case of mid-year promotions, a complication arises. There is no question but that the physical environment unit should come first, in whichever term it falls. But, if the second half-year of the pupil be a fall term, the seasonal advantage should probably take precedence. Thus in such cases, the animal and plant units change places in the individual program, so that the plant unit always comes in the spring and the animal unit always in the fall.

THIRD HALF-YEAR. "Animals. Much that has been said under Second Half-year applies here. The number of types studied will be much fewer than in year courses in zoology, and the course will have a distinctly "practically" aspect. Yet it will be soundly organized as zoology, and will not be merely superficial study of various zoological topics out of their proper setting. It will lead up to the study of man from the biological aspect.

FOURTH HALF-YEAR. "Man. A course in which hygiene and sanitation are emphasized. A course which deals with essentially modern conditions, thus preserving the genetic sequence. Applications of science to human welfare and convenience are now eligible for consideration as basic as well as illustrative. The pupil is now in a position to understand the precepts of modern hygiene and sanitation in their individual and social aspects as essential adjustments to great facts of nature of which he has real grap. This is quite another and a better thing than the teaching of this subject through mere insistence on certain facts and rules whose relationships are perceived but vaguely, if at all, a method which is requisite if this unit comes without such introductory work as has been indicated.

"FINALLY.—To be valid, any plan for the reorganization of the science courses must rest on more than pedagogical theory or the interpretations of a random referendum. It must take into consideration what may be called "factors of limitation," cold rather than warm facts which confront us when it comes to putting any educational scheme into general operation. And the value of our plan will not rest upon its excellence with respect to one or with respect to several of these facts. It will rest upon the extent to which it takes them all into consideration and meets their aggregate demands. Leading factors in the problem may be tabulated as follows:

(1) The Psychological Factor. The pupil wants organization and is ready for inductions if he has sufficient basic data.

(2) The Social Factor. Democratic society requires a common stock of knowledge and calls urgently for scientific methods in thought as well as in action.

(3) The Administrative Factors:
- a. Quality of the teachers.
- b. Schedule of the teachers.
- c. Size of classes.
- d. Materials available.
- e. Time available with respect to claims of other studies.

"If the plan which has been presented is acceptable, as the present status of opinion regarding it strongly indicates, it is acceptable because it is based on careful consideration of these "cold" facts which limit the application of our theories, facts of practice and of opinion which have been collected with care and consdered with patience and without previous bias."

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PRELIMINARY REPORT OF THE BIOLOGY SUB-COMMITTEE (ON REORGANIZATION OF SECONDARY EDUCATION) OF THE NATIONAL EDUCATION ASSOCIATION.[1]

A. Organization of the Sub-Committee.

In the autumn of 1913, Chairman Orr of the Committee on Natural Science appointed the undersigned sub-committee of seventeen to suggest the aims, the content, and desirable methods of instruction in secondary school biology. The committee as now organized consists of ten high school teachers, three college or university professors, three normal school instructors, and one physician. The geographical distribution of the committee membership is as follows: five members from New York and vicinity, five from Chicago and vicinity, three from New England, and four from the Pacific coast.

During the past winter and spring seven meetings of the committee have been held in New York City, and the Chicago, the New England, and the Pacific coast groups have had several conferences of their group members. As the outcome of all these meetings the committee begs leave to submit this preliminary report, in the hope that it will stimulate a great deal of discussion and constructive criticism.

B. Fundamental Principles.

The committee maintains that *unity of subject matter in any course in science is of first importance,* by which is meant that the subject matter should be so organized that appreciation of *underlying principles* shall form the foundation of the student's knowledge, thus giving him a scientific basis for the organization of his knowledge.

The committee unanimously agrees that a course in elementary science should include a study of the physical environment of living things; and a consideration of plants, animals, and man as living organisms; and that throughout the course constant reference should be made to the application of science to human welfare and convenience.

C. How We Would Plan the Work.

The committee unanimously agrees that *two years of work in elementary science* should be the basis for the more advanced courses in science. Such work should deal with physical environment (including a study of matter and forces), plants, animals (including man), and the general applications of scientific principles to human welfare. If, however, administrative conditions make a two-year course out of the question, we recommend a first year course required of all, and a second year elective.

D. What We Believe Should be Taught.

We maintain that the aim in teaching elementary science should be (1) to train the pupil in observation and reasoning; (2) to acquaint him with his environment and with the common forms of plant and animal life, and especially with the structure, functions, and care of his own body, together with the general biological principles derived from this study; and (3) to show him his place in nature and his share of responsibility for the present and future of human society.

Our general ideas as to content of such a course are stated in Appendixes A, B, C, and D. From these lists of topics it ought to be possible for teachers in rural communities, or in towns, or in large city high schools to prepare an outline of work adapted to the given conditions. In the final report several combinations of topics that have proved satisfactory in typical high schools will be presented.

It will be evident to any one who looks over these lists of topics that in our judgment *human welfare* is the motive that should underlie all elementary instruction in science. While we believe that the *principles of reproduction* should form a part of every course in biology, we do not believe that formal instruction in *sex hygiene* should be compulsory in the class room.

E. How We Would Teach the Subject.

We do not believe in rigidity of method in science instruction. Quizzes, conferences, experiments, individual reports, excursions, text-assignments are good. They offer a rich and varied choice of pedagogical method and each teacher should be given freedom to develop the methods best adapted to his own group of students and to the environment of the school in which he is teaching.

In the laboratory work time should not be wasted in detailed microscopical work, in complicated experimentation, in useless attention to drawing or other "busy work." All laboratory work should be based on definite information ungrudgingly (and interestingly) furnished, and should be in the nature of a direct effort to acquire more knowledge at first hand. Experiments, results, and conclusions should be accurately recorded. Neatness in note-book records is desirable, but must not be exalted above thinking or understanding.

Appendix A.

Physical Environment.

The preparation of an outline for teaching the part of the course in elementary science which deals with the matter and forces of the physical environment, together with the general applications of the principles of science to human welfare and convenience awaits the coöperation of the other subcommittees in the sciences. For it is our hope that in the near future all the science committees of the National Education Association will unite and contribute of their best thought in constructing a course in elementary

science so full of promise that no school can afford to omit the teaching of its universal principles. (Such an outline is now under consideration.)

APPENDIX B.

Plants.

I. Introductory.

1. Inventory of knowledge about plants already possessed by students. Motives for further study. Consideration of the method of study.
2. The general relations of plants to animals and man. Diversity of form and habitat of plants. Aesthetic as well as economic values of the study.
3. Consideration of the familiar parts of a typical green plant, with functions of these parts.

II. Nutrition (the essentials to be obtained through a study of the following organs—details of external and internal structure to be presented only so far as is necessary to an understanding of the functions of the organs).

1. Roots—absorption (method and materials absorbed); transmission of absorbed materials; storage of food; anchorage of plant.
2. Stems—upward and downward movement of sap; storage of food; supporting functions of stem; types of stems and their method of growth.
3. Leaves—photosynthesis and the production of the various nutrients; digestion; transpiration; respiration.
4. Review of the nutritive process as a whole in green plants.
5. Nutritive processes in plants that are not green (*e. g.*, bacteria, yeasts, molds, and other fungi).

III. Reproduction (the essentials to be obtained through a study of the following organs—details of external and internal structure to be presented only so far as is necessary to an understanding of the functions of the organs).

1. Flowers—pollination; fertilization; formation of the embryo.
2. Fruits—seed protection; seed dispersal.
3. Seeds—protection and nourishment of the embryo; seed dispersal; germination of seeds, with review of the nutritive processes involved.

IV. Applications of plant biology to human welfare.
Topics to be listed in final report.)

V. Survey of plant groups and plant identifications.
Topics to be listed in final report.)

APPENDIX C.

Animals.

1. Animals in general—their structure, classification, distribution, ecological relations. Comparative (gross) anatomy of animals chosen

to illustrate the principal branches of the animal kingdom; the types selected for study might well be chosen from the following list: amoeba, hydra, earth-worm, snail or slug, crustacean, insects, fish, frog or salamander, bird. Detailed dissections, if attempted, should be confined to one or two types.

II. Life histories of typical animals (preferably chosen in groups, with several allied forms in each group, so that the types may not appear too sharply isolated. Study of reproductive processes (both asexual and sexual), developmental phenomena, growth, metamorphosis.

III. Response to physical environment; geographical distribution; seasonal occurrence; trophic reactions.

IV. Response to organic environment in particular; competition with other forms; parasitism; symbiosis; economic importance of animals to man.

V. The continuity of life as evidenced in the relation of germ-plasm to soma; in the known genetic relationship of widely different types of domesticated animals, and the structural affinities observed in other animals; in the paleontological record.

VI. Man's place in nature—historic and economic aspects of human life; family and community life; care of the young; close dependence on a multitude of other kinds of life; geographical distribution; migrations.

VII. Man's opportunity to use his biological knowledge—applications of biology in medicine, sanitation, agriculture, forestry, manufactures; contributions of biology to investigations of the mechanics of flight, production of light; methods of investigation; organization of experiments; historical examples of research (Redi, Spallanzani, Harvey, Darwin, Mendel, Pasteur, and their epoch-making studies).

Appendix D.

Man.

I. General structure of the human body. Attention should be directed to the similarities and contrasts in the organs of the lower vertebrates and of man calling special attention to those that result from the erect posture of the latter. The characteristics of a half dozen of the most common tissues (*e. g.*, bone, muscle, cartilage, connective tissue, blood and nerve tissue) should be demonstrated, and a few types of human cells (*e. g.*, lining of mouth and blood corpuscles) should be shown under the microscope or with the projection lantern.

II. Physiology.

A. Nutrition.

1. Food and diet—sources of common animal and vegetable foods; the

different nutrients present in a few staple foods; uses of each nutrient.

2. Preparation of food for use by the cells; digestion and absorption in the mouth, in the stomach, and in the intestines.
3. Oxygen supply of the cells; necessity of oxygen for the release of energy; adaptations of air passages, lungs, skeleton, and muscles for supplying oxygen to the blood.
4. Distribution of food and oxygen to the cells; composition of the blood through the body; functions of heart, arteries, capillaries, and veins; composition and use of lymph; exchange of materials between tissues and blood.
5. Uses of materials in the cells.
6. Removal of wastes from the cells and from the body.

B. Functions of the tissues.

1. The skeleton—its use as a framework, as a protection for organs; its use in movement.
2. The muscles as organs for activity; position and action of two or three typical muscles.
3. The nervous system—position, parts, and functions of brain, spinal cord, and nerves; importance of habit; sensations of taste, touch, smell, sight, hearing.
4. Internal secretions and their functions (hormones and ductless glands, *e. g.*, thyroid and thymus).

III. Hygienic care of the body.

1. Healthful diets; economy in the choice of foods; hygienic care and preparation of foods.
2. Alcohol, tobacco, opium, cocaine, and other drugs and patent medicines—danger in the use of these substances.
3. Importance of regularity in removal of refuse from intestines and bladder; prevention of constipation.
4. Exercise in relation to the realth and development of the body; necessity for rest; varied activity as a means of rest.
5. Clothing and its relation to health.
6. Cleanliness of the body.
7. First aid to the injured.
8. Hygiene of eyes, ears, nose, and throat.

IV. Bacteria and sanitation.

1. General characteristics of bacteria—distribution, form, size; reproduction and conditions favorable and unfavorable for growth.
2. Economic and sanitary measures based on knowledge of bacteria (*e. g.*, food preservation, soil inoculation, prevention of disease).
3. Prevention of disease by the individual.
   a. Fresh air; pure foods, pure water; healthful exercise; sufficient sleep.

b. Cleanly habits at home and in public places; dangers of dust; proper methods of sweeping and dusting; care of home premises and of fooods; treatment of wounds; coöperation with civic authorities.

4. Prevention of disease by civic authorities.
   a. Care of streets, public places, water supply, sewerage, and drainage; supervision of milk and of other foods.
   b. Methods of securing immunity; quarantine; disinfection.

Appendix E.

Further Suggestions as to Methods in Biological Study.

In outlining this report the committee is aware that some schools may prefer to conduct half year or even whole year courses in botany, zoölogy, and in human physiology and hygiene. The commttee believes, however, that the outlines suggested above are sufficiently elastic and inclusive to provide for these varying needs of the introductory courses in biology. We are confident, also, that there will be an increasing demand for full year biology electives in the later years of the high school curriculum, in which the morphological and evolutionary aspects of the subject may well be given considerable emphasis.

The laboratory method in science was such an emancipation from the old time bookish slavery of pre-laboratory days that many teachers have been inclined to overdo it and subject themselves to a new slavery. It should never be forgotten that the laboratory is simply a means to an end—that the dominant aim in all laboratory instruction should be a consistent chain of ideas which the laboratory may serve to elucidate. When, however, the laboratory assumes the first place, and other phases of the course are made explanatory to it, the attitude is fundamentally wrong. The question is not what *types* may be taken up in the laboratory to be fitted into the general scheme afterwards, but what *ideas* are most worth while to be worked out and developed in the laboratory, if that happens to be the best way of doing it; or if not, some other way should be adopted with perfect freedom.

Too often our study of an animal or of a plant takes the easiest rather than the most illuminating path. What is easier, for instance, particularly with large classes of restless pupils who apparently need to be kept in a condition of uniform ocupation, than to kill a supply of animals, preferably as nearly alike as possible, and set the pupils to work drawing the dead remains? This method is often supplemented by a series of questions concerning the remains which are sure to keep the pupils busy a while longer, perhaps until the bell strikes—questions usually so planned as to anticipate any ideas that might naturally crop up in the pupil's mind during the drawing exercise.

Such an abuse of the laboratory idea is all wrong and should be avoided. The ideal biological laboratory is only a reasonably good substitute for out-

of-doors. Any course in biology, however, that can be confined within four walls, even if these walls be those of a modern, well-equipped laboratory, is in some measure a failure. Living things, to be appreciated and correctly interpreted, must be seen and studied in the open where they will be encountered in life. The place where an animal or plant is found is just as important a characteristic as its shape or function. Impossible field excursions with large classes within school hours, which only bring confusion to inflexible school programs, are not necessary to accomplish this result. Properly administered, the laboratory is doubtless one of the most efficient devices for developing biological ideas; but the laboratory should be kept in its proper relation to the other means at our disposal, and never be allowed to degenerate either into a place for vacuous drawing exercises or a biological morgue where dead remains are viewed.

The committee is unanimous that the work in human biology should be closely correlated with plant and animal biology, and that emphasis should continually be laid on personal hygiene and sanitation. Details of structure and anatomical terms should, therefore, be given only when they are needed for an understanding of the given function or for correlation with other parts of the course. It should be understood that while the topics in hygiene and sanitation for convenience are grouped together in the suggested content (above), in framing a course these various topics should be taught in connection with the various physiological functions with which they are most closely associated.

To present the various topics most effectively, a manakin and a human skeleton should be available. If, however, this is impossible, charts, pictures, and blackboard diagrams should be freely used. Bones, joints, hearts, lungs, and other organs available in a butcher's shop should be employed for demonstration. The student should always be led, however, to refer the various functions and hygienic applications to his own body, and care should be taken to see that few experiments are performed that do not have possibilities of this practical nature.

To illustrate methods that might well be employed in biological instruction, a few of the topics will later be outlined in detail. The final report will contain suggestions as to better methods of training teachers of biology. The committee plans also to submit a list of apparatus, charts, chemicals, and reliable books of reference that in their experience have been found useful.

During the present year the Biology Sub-Committee is planning to supplement its preliminary report by compiling for the use of teachers information along the following lines:

A. SYLLABI of courses in biology which have proved successful. Each syllabus should be accompanied by a clear statement of what it aims to accomplish, with reasons for believing that it does accomplish these ends.

B. Special Experiments in teaching-methods, covering separate phases of biology teaching. Under this head, send only results which have been strikingly successful.

C. Materials which have been successfully used for illustration or experiment. We wish to discover to what extent the use of home-made apparatus can develop interest in experimentation.

D. Plans for Co-operative Observation among the students, either at home or in school.

E. Titles of Reference Books or Text-books of particular value.

Each member of the committee will be glad to receive all posible information on these points from teachers in his locality, and will send it to the chairman at an early date. Please send reports as soon as possible to one of the following:

James Edward Peabody, *Chairman,* Morris High School, New York City.

Dr. Edna Bailey, 1720 La Loma Avenue, Berkeley, Cal.

Dr. Thomas Spees Carrington, United Charities Building, New York City.

Dr. Grace C. Cooley, East Side Commercial and Manual Training High School, Newark, N. J.

Dr. John G. Coulter, Box 235, Bloomington, Illinois.

Dr. Walter Hollis Eddy, High School of Commerce, New York City.

Dr. J. C. Elder, High School, San Jose, Cal.

William L. W. Field, Milton Academy, Milton, Mass.

Dr. LeRoy H. Harvey, State Normal School, Kalamazoo, Michigan.

Dr. Chas. H. Kofoid, University of California, Berkeley, Cal.

Dr. George H. Parker, Harvard University, Cambridge, Mass.

Miss Mabel Peirson, High School, Pasadena, Cal.

Miss Lillian Belle Sage, Washington Irving High School, New York City.

Harold B. Shinn, Carl Schurz High Schoool, Chicago, Ill.

Ernest S. Tillmann, High School, Hammond, Ind.

Dr. Fred Ullrich, State Normal School, Platteville, Wis.

Dr. Herbert E. Walter, Brown University, Providence, R. I.

DISCUSSION OF THE PROPOSALS OF THE BIOLOGY SUB-COMMITTEE OF THE NATIONAL EDUCATIONAL ASSOCIATION FOR THE REORGANIZATION OF SCIENCE IN SECONDARY SCHOOLS.

PRINCIPAL W. LE ROY PERKINS, DOWAGIAC.

Mr. Chairman and members of the Science Conferences:—

As the Geography sub-committee of the National Educational Association has not made its report on the reorganization of science in high schools, we are allowed an extensive range in our discussion of the proposals made by the Biology sub-committee as they have been outlined by our Michigan representative, Dr. Harvey. I trust that my part on this program will be *to open* the discussion from the viewpoint of Physiography, as there are many teachers here who are better fitted to present a logical discussion than I am.

Owing to the possibility of a misunderstanding, I wish to emphasize the fact that there is a distinction between Geography and Physiography, although, as far as we are concerned here today, there is probably no necessity for us to draw a close line of demarkation between the two. Quoting from a recent text, Geography proper is divided into:—(a), a study of the physical features of the earth, (or Physiography as some would define the term), and, (b), earth relations to life. Many high schools of this state have chosen a text in Geography for their classes in Physiography, hoping thereby to make the course more practical according to our present-day ideas of that term. Without further comment as to the advisability of such a choice, and following the discussion as a representative of the Physiography section, I see no reason why we cannot treat Geography and Physiography as synonymous at this time, and will attempt to combine the two standpoints in what I shall say.

The Biology sub-committee recommends that the *fundamental principles* should be given first importance in the teaching of all sciences. I know of no member of the Physiography section who will seek to overthrow this idea. We high school teachers come in for our share of just criticism for not laying enough stress on the *fundamentals* of our sciences, and it is possible that this is one of the main inefficiencies of our present system. In Physiography, as it is handled today in the ninth or tenth grade, serving as a forerunner of Chemistry and Physics, it is absolutely necessary that the teacher insist upon the driving home of underlying principles, not only because they are essential to a working knowledge of Physiography alone, but to the sciences which follow in the junior and senior years, as well.

The committee suggests that a two-years course in elementary science

be required of all students in science, as I understand the proposal, to be followed by electives in as many special sciences as there are teachers for those courses. Further, that the elementary science course be divided and correlated as follows:—

(1) Physical environment, (which embraces the principles of Physiography and Physics), for the first semester of the high school course;

(2) Plants, the second semester,

(3) Animals, including man, the third semester, and,

(4) General applications of scientific principles to human welfare, (or, in reality, Hygiene and Sanitation), the fourth semester.

Besides the special emphasis placed upon correlation of subject matter, there are several striking differences between the system suggested and our present system. I do not enumerate these points because I want to adhere to the old ideas regardless of the possibilities of the new, but simply to arrive at a point wherefrom we can open a suggestive discussion. To me the main points of difference between the proposed two-year course in elementary science and our present arrangement are:—

(1) That a two-year course in elementary science is required of all science students, after which they may drop science entirely or may pursue such special sciences as the school offers and their fancies direct,

(2) That subjects are to be presented in a different order,

(3) That a summarizing course is to be given, and,

(4) That Physiography, Botany, and Zoology, are limited to half-year subjects.

(1) If a two-year course in elementary science were adopted, a revision of college entrance requirements would be demanded at once. Colleges now require one year of science for entrance and in many high schools where there is not a prescribed course of study in science we find students taking Chemistry and Physics who have not had a single course in elementary science. This fact is especially true in high schools where Physics is the required science. Those of us who have had the responsibility of teaching advanced science in the high school fully realize the need of elementary courses before the advanced work is taken up, and I am sure that all of us would be willing to support a prescribed course in elementary science if viewed from this standpoint alone.

There is another phase to the discussion, however. This first two years course in science is to be followed by electives in the last two years. I ask, how many electives, and am answered that the number of electives depends upon the number of teachers for those sciences. We may assume that the larger high schools will be able to offer advanced courses in Botany, and the present courses in Chemistry and Physics (and Astronomy, Physiology, and Hygiene, if we follow the two-year course to the letter).

The smaller high schools which can afford only one science teacher will have to be content with their two-year course and possibly two special sciences. Then the question naturally suggests itself, *What electives in science will be offered?* Here there is apparently a chance for even a wider range of science courses to be offered than we have now. Unless there is a definite agreement as to the courses following the general science, the high schools of this state might present one grand medley of courses offered, and the general subject of science be made to suffer therefrom. If the student is to be given an opportunity in the first two years to "try out" general science and select his favorite subject for special study during his last two years, (and this is perfectly reasonable to assume,) how is he going to follow his course if his school doesn't offer it?

As a summary to the questions which have already occurred I wish to add another. If we are to have a prescribed course in science for the first two years, why not extend it through the entire four years? This may seem foolish at first thought, but if you consider it more thoroughly you will find it hard to answer. We are told that "unity of subject-matter in any course in science is of first importance"; why not follow this out through the junior and senior years and thus establish uniformity *throughout* the course?

(2) The Biology sub-committee suggests an entirely different arrangement of subjects from the one now in vogue. Physiography as an elementary subject comes first, Botany second, Zoology third, and a summarizing course dealing with Hygiene and Sanitation follows. The possible objections to this arrangement, as far as Physiography is concerned, will be considered later.

(3) One great point which I am particularly impressed with in the proposals of the Biology sub-committee is the suggestion of a course which we might call a "summarizing course." The committee chooses to consider Hygiene and Sanitation during the second semester of the second year. No matter whether we accept or reject the two-year science course, in either case we are in need of just such a course as this. Teach as carefully as we may, there are always points which students fail to understand because they fail to apply them. In this course "science is applied to human welfare and convenience" directly, thus pointing out to the student the practical side of all the sciences which he has studied and furnishing a re-correlation of the fundamental principles which he has considered in the various branches.

(4) The fourth point of difference between the proposed system and the one in vogue, which we of the Physiography section are liable to notice more quickly than anyone else perhaps, is that some of the elementary sciences are to be given as half-year courses. Of course only the *elements* of those sciences are to be given, but we are told that some of the leading principles of Physics are to be taught along with physical environment or Phys-

iography. I am proud to say that no other subject leads up to a study of Physics so admirably as does Physiography. The Department of Public Instruction of Ohio recognized the above fact when they recently concluded a discussion of introductory science with the following:—

> "Another study which may serve well as an introduction to the more formal science branches, is Physiography. When intelligently pursued it is of high informing value along lines that are of importance. Proceeding upon the study of physiographic features as a basis, it should develop effective insight into the controls operating between man and his habitat, thus meeting as fully as perhaps any other study that could be named, the end for which science studies are carried on."

Undoubtedly I would want to teach too much during this first half year, but I cannot see how even the *principles* of Physiography, covering the extensive field as outlined, could be taught in this brief space of time. The recent texts in General Science, which are intended for full year courses, devote much more than half their space to a study of physical environment. Another factor which would militate against the teaching of physical principles in so short a time is the general unsettled condition of the pupil who has just entered the high school from the grades. In a six-year high school this objection would be eliminated.

The subject of *plants* is to be considered in the Spring semester, according to the arrangement in the report, because of the "seasonal advantage" of presenting the subject at that time. In another part of the report field excursions are recommended for the teaching of those subjects in which such excursions may be used to advantage. Physiography, or physical environment, requires first-hand studies in order that it be made practical. We are asked to treat under the heading "Physical Environment," the relation of the earth to the other members of the solar system, and the general subjects such as light, air, heat, water, and soil. Considering these in the order named we would study water and soil during the late Fall and early Winter. Naturally there would be a seasonal disadvantage in the study of physical environment in the Fall semester; the student would have no opportunity to study the relationship between water and soil, and plants and animals, and thus the foundation of the proposed two-year course would be undermined in the student's *first introduction* to organized science. Teachers of Physiography generally recognize the need of an arrangement of subject-matter in such a manner as to permit of excursions in the Spring. This is evidenced by most of the latest books on the subject in which Meteorology and Oceanography are studied during the Fall semester and Physiography proper is taken up in the second semester.

A course in general science extending through two years will make great demands upon teachers by way of preparation. How many of the high school teachers here today would feel capable of handling such a

course as the one proposed? How many have had college courses in Astronomy, Physiography, Botany, Zoology, and Hygiene and Sanitation, (and we might add to these Physiology, Chemistry, and Physics)? Yet all these are necessary even if the teacher is to handle only one year of this science, for how, otherwise, would it be possible for the teacher to so unify the subject-matter as to gain the end sought? Estimating conservatively we find that more than seventy hours of college work in science would be essential for a real working knowledge of this course in science, so great is its scope. It will demand a generalization in science while the tendency today is toward specialization. Will it be possble to secure enough teachers for the course in this state? Our greatest difficulty today is inefficient preparation; will not a course which makes even greater demands for preparation introduce even a greater degree of chance for poor preparation and therefore increased criticism? If we teachers in the secondary schools had already made as thorough a preparation as this course will demand, I question if it would be necessary for us to be trying to devise a means of making elementary science worth while; we would have enough science at our command, which, coupled with even a moderate teaching ability, would not only withstand the attacks of *Criticism,* but would be hurling forty-two centimeter shells into his camp every day of the year.

Difficulties naturally arise in the general discussion of a subject of such import as the one before us today, when the various sciences are involved, and it is easy for each of us to accuse the other of bias and partiality. I trust, as I stated before that this paper will *open* the subject from the standpoint of Physiography for an impartial discussion. Whether the pendulum swings ultimately toward the two-year course as proposed by the Biology sub-committee, or back to the present system, I assure you that those of the Physiography section with whom I am acquainted, will enter into the carrying out of the plans whole-heartedly, for we are all working toward the same end, the accomplishment of the *best* results in the teaching of science in secondary schools.

MENDELISM AND THE MUTATION THEORY.

DR. JOHN S. DEXTER, OLIVET COLLEGE.

At the beginning of the present century there occurred in the biological world two events of unusual significance. These were the "rediscovery of Mendelism," and the publication by DeVries of his "The Mutations Theory." The intimate relations that have existed since then between these two subjects justify us, I think, in considering them together here.

Gregor Mendel, born in 1822 in Austrian Silesia, was an Augustinian

monk who, in addition to his duties as a churchman, and as a teacher of physics in the Realschule at Brünn, studied heredity in plants and animals. He felt that the experiments in this subject up to his time were notably deficient in three respects. He says: "Those who survey the work done in this department will arrive at the conviction that among all the numerous experiments made, not one has been carried out to such an extent and in such a way as to make it possible to determine the number of different forms under which the offspring of hybrids appear, or to arrange these forms with certainty according to their separate generations, or definitely to ascertain their statistical relations."

He worked especially with garden peas and the paper in which his work on this plant is described has become one of the classics of biological literature.

I will not describe his experiments. They are similar to and in entire harmony with other experiments that I will describe in a few moments. His explanation of his results will be considered after we have presented the facts.

The Theory of Evolution as propounded by Darwin met with phenomenal success. In spite of tremendous opposition, especially from certain branches of the church, within a score of years after the publication of "The Origin of Species," evolution was fully accepted by practically all educated men as an indubitable fact. At the present time it is believed in by many of us with a somewhat undue fervor that closely simulates dogmatism. Nevertheless the fact remains that our mental condition has been well stated by Bateson, as follows: "It is easy to imagine how man was evolved from an Amoeba, but we cannot form a plausible guess as to how *Veronica agrestis* and *Veronica polita* were evolved, either one from the other, or both from a common form. We have not even an inklng of the steps by which a Silver Wyandotte fowl descended from Gallus bankiva (the jungle fowl), and we can scarcely even believe that it did."

According to Darwin, the method of Evolution was the selection of favorable variations. It was known that variations might be small or great, but Natural Selection was supposed to operate chiefly with those minute variations now known as "fluctuating" or "continuous" variations.

Much study of this problem has shown that variations are of two very different sorts so far as heredity is concerned: *viz.*, inheritable and non-inheritable variations, and the conclusion seems reasonable that Evolution can work only with those of the former sort. Modern theory says that inheritable variations are brought about by virtue of a change in the germ-plasm, and this change is called mutation. (That paleontologists use the word mutation in quite a different sense, and, on the other hand, that Lotsy and some others ascribe all inheritable variation to Mendelian recombination, need not concern us here. Nor need we attempt to define exactly what we shall consider as germ plasm further than to say that germ plasm is that part of the

sex cells by virtue of which an individual directly acquires the power to reproduce the characteristics of its parents.)

A mutation need not of necessity be a great variation. Its effect on the appearance of an indivdual may be almost indistinguishable. On the other hand, non-inheritable variations may be very great, as shown by the non-inheritance of many great bodily deformities. The test of a mutation, at least in sexual modes of reproduction is simply this: Are its effects inheritable from generation to generation? This, in theory, is equivalent to saying, Was the variation caused by a change in the germ plasm?

In illustration both of Mendelism and the Mutation Theory, I shall deal with material with which I am very familiar, *viz.*, with the fruit-fly, *Drosophila ampelophila*. This fiy is known to most of you as the tiny gray fly found in summer and autumn about fruit stands and stores, or wherever fruit is exposed for any length of time. It seems probable that it is imported to our regions anew every year in bunches of bananas, as it seems not to survive the rigors of our winters. Be that as it may, at least it thrives abundantly on bananas, especially if overripe or fermented, and in the laboratory it is reared in milk bottles supplied with fermented bananas wrapped in filter paper. It develops rapidly and in warm weather produces a new generation every eight or nine days; under ordinary laboratory conditions in winter the life cycle is prolonged to nearly two weeks. Even so, it is possible to see the grandchildren of a pair of flies in a month from the time of mating, and if such a pair, and every pair of their children should produce two hundred offspring, (a moderate estimate,) 20,000 grandchildren would result. For obvious reasons, such an experiment is not carried out in practice.

For the purpose of studying various problems of heredity, T. H. Morgan began about in 1908 or 1909 to rear *Drosophila* in the laboratory. The stock with which he started was gathered wild (not, I think, by himself). Large numbers of flies were reared, and after being etherized, each was carefully examined under a hand lens. For a long time the flies bred true to the type found wild, and not till 1910 were any marked changes observed.

The normal wild fly has a body of a grayish brown color, its wings are long and when at rest are held horizontally over the back in a way somewhat similar to that of the house fly. The eyes are a dark red, opaque and dense. To this type apparently without exception belonged every one of the hundreds of thousands of flies that Morgan examined during these first years.

Many attempts were made to cause the fly to produce new forms. Some were exposed to radium, some were given with their food chemical substances of various sorts, such as ether, alcohol, chloroform, and inorganic compounds, etc. Some were given too much water, some too little. All attempts were ineffectual so far as could be determined. The flies continued to breed true. To this day, so far as I know, no light has been shed on the reason why flies that had for so long bred true should on rare occasions mutate, that is, give origin to new forms. That problem is still ocupying

the attention of several students of *Drosophila,* and of the other workers in other fields of heredity. But though the cause of the mutation is still unknown, the fact of the appearance of the mutant can not be questioned.

In 1910, in a bottle containing red-eyed flies, whose ancestors for all known generations had been only red-eyed, a male fly was found whose eyes were white. This fly was mated to red-eyed flies and gave rise in a few generations to a white-eyed race that breeds true, and among whose offspring red-eyed flies are now as rare as white-eyed flies were among the offspring of his ancestors.

In the days that followed other new forms appeared from time to time, and now, some five years after the appearance of the first white-eyed mutant, not less than two hundred mutants have been discovered and isolated, and true breeding races have been produced from them.

These mutants vary from the wild stock in almost every conceivable character. In eye color, for instance, there have been found many shades of red varying from that of the wild fly. One race has eyes that are almost black. One has eyes of a brilliant vermillion. Another race, called pink-eyed, appears to lack black pigment within the ommatidia, so that the eyes, though of a shade of red almost like that of the wild, have a transparent, opalescent appearance, markedly unlike that of the wild fly. Other eye colors are called Purple, Maroon, Eosin, etc. Wings also vary in many ways. Some races have no wings; others have wings of normal shape but much reduced in size. Some have wings of peculiar shapes; others hold their wings at abnormal angles to the body. Such names as Spread, Vestigial, Miniature, Curved, Arc, Jaunty, Rudimentary, etc., are descriptive of some of these wing types, and here again the races breed perfectly true to their new form. Body colors with such names as Yellow, Brown, Black, Sooty, Lemon, Ebony, etc., will give you an idea of the different races produced in respect to this character. Woolly, Doxy (meaning dachshund,—a short-legged race), Barred-eyed, Bristly, Abnormal abdomen, Kidney-eyed are names given to various other mutants. And one form which looks perfectly normal produces two females to one male, and is known as Lethal.

It is worthy of note that most of the mutants, probably indeed every one that has arisen thus far is weak, or possesses characteristics that would bring about its rapid extinction in a "state of Nature," and therefore, though the evidence does not justify us in saying that these mutations occur in nature as well as in the laboratory, it does justify us in saying that even if they do occur, there is abundant reason for their being rarely found, simply because they are so soon exterminated.

We have seen then that in this species of fly inheritable variations are frequently occurring by which new races are established. From our definition of germ plasm, we say that the races are brought about by virtue of a change in the germ plasm, *i. e.,* by mutation. Whether or not new species could ever be produced by the accumulation of variations of the order shown in *Drosophila* is a serious question and one which I am by no means ready

to answer in the affirmative. I do believe however that we are on the right track.

It remains for us to investigate the behavior of these races when mated *inter se.* In general it may be said that in cases thus far thoroughly investigated, the phenomena of inheritance in *Drosophila* are typically Mendelian, and in the simpler cases, so clearly so, that Mendel himself could not have desired a more excellent demonstration of the truth of his views. Incidentally, it may be worth while to add, such crosses make admirable laboratory experiments for students beginning work in Genetics because of the rapid succession of the generations, the ease with which the material is handled, and the inexpensiveness of the equipment.

In general, the inheritance of these characters in *Drosophila* is of two types, depending on whether or not the character is sex-linked. For simplicity's sake it will be well to begin with a case of non-sex-linked inheritance.

Such a case may be studied if a fly of the ordinary wild type (long-winged), be mated to one with vestigial wings. The result is identical whether the long-winged fly be the male or female parent. All of the offspring in the first generation will have long wings, similar apparently in all respects to those of the long-winged parent. The most careful scrutiny of the flies of this generation will fail to show that the vestigial-winged fly has had the slightest influence on the bodily characters of its offspring. If however these flies of the first filial (F_1) generation be mated in pairs, brother to sister, vestigial-winged flies will appear among their offspring in the proportion of one vestigial-winged fly to three with normal wings. If these flies of the second filial (F_2) generation be further tested, the following facts will appear. If two vestigial-winged flies be mated, only vestigial-winged flies will appear among their offspring. A pure race will be at once established, and the effect of the two generations of long-winged parents will never again show itself. If, on the other hand, the long-winged F_2 flies are studied, they will be found to be of two sorts. One-third of them will breed true as long-winged flies, never again throwing flies with vestigial wings. The other two-thirds of the long-winged flies will give in their offspring long-winged and vestigial-winged flies, and are of the same germinal constitution with respct to wing-inheritance as their parents of the F_1 generation.

These facts are entirely parallel to those described by Mendel in the case of yellow peas crossed to green peas, the green peas behaving in heredity like the vestigial-winged flies.

The explanation of these facts according to the Mendelian theory is as follows:—

Every individual carries in the germ plasm from which it was produced, and from which its own germ cells will be formed, two factors, or as we usually say, genes, one from the father and one from the mother, for the

determination of each separately inheritable characteristic of that individual. But though these two genes exist together in the individual, they always separate from each other when the germ cells of that individual are formed; so that two genes that were the mates of each other in the individual exist only singly in the germ cells. On these two assumptions all the essentials of Mendelian theory are based.

Applied to our vestigial-long crosses, we get the following:—The pure bred long-winged fly had two genes for long-wingedness in its germ plasm, and so though its germ cells carry only one gene, it must be a gene for long-wingedness. In other words, such a fly cannot do otherwise than breed true for long wings. Likewise the vestigial-winged fly carries two genes for vestigial wings, and though these genes separate in the germ cells, still all the germ cells carry the gene for vestigial wings. Now when a long-winged fly is mated to one with vestigial wings, a germ cell with a gene for long wings (we will say L) meets of course one with a gene for vestigial wings (V) and the new individual is not LL like one parent, nor VV like the other, but LV. Because long wings are dominant over short wings, the individual is long-winged but when its germ cells are formed, one half of the them carry L and one half carry V. If now one of these individuals of the F_1 generation with eggs half carrying L and half carrying V, be mated to another with sperm of which one half carries L and one half carries V, it appears that in the following (F_2) generation, the following types of individuals might be formed. An egg carrying L might meet a sperm carrying L; result, a long-winged LL individual which would breed true in future. Second, an egg carrying L might meet a sperm carrying V; result, an LV individual which would have long wings but which would give long-winged and vestigial-winged flies in later generatins. Third, an egg carrying V might meet a sperm carrying L; result, a long-winged LV individual in all respects like the last named. Fourth and finally, an egg carrying V might meet a sperm carrying V; result, a vestigial-winged individual which would breed true for vestigial wings. To sum up our four possibilities, we would get in the F_2 generation three long-winged to one vestigial-winged individual. The vestigial-winged flies would all breed true. One third of the long-winged flies would also breed true. Two thirds of them would give among their offspring long and short winged forms again.

To consider a more complex case, if we wish to find the result of mating a vestigial-winged fly with red eyes, to a long-winged fly with sepia eyes, we would proceed in exactly the same way. We would find red eyes to be dominant over sepia eyes, and that the two types are determined by a pair of genes that may be called R and S for red and sepia respectively. We must remember that R and S are members of one pair of genes, that is, that they are mates to each other only, and are independent of L and V. When therefore germ cells are formed by the F_1 individual who has received V and R from one parent and L and S from the other, S and R cannot occur together, but S might occupy the same germ cell with either L or V, and so

might R. In other words germ cells of the following sorts would be formed: LR, LS, VR, VS. The union of eggs and sperms of these four sorts would give in the E_2 generation red and sepia eyes in the proportion of 3:1 and long and vestigial wings in the proportion of 3:1, but some of the reds would be long and some would be vestigial, and this would also be true of the sepias. So that the F_2 generation would consist of red long, red vestigial, sepia long, and sepia vestigial in the proportion of 9:3:3:1 respectively.

We have only time to describe hastily without the explanation which is entirely simple and in accord with Mendelian theory, the behavior in heredity of sex-linked characters. We will take the best known case, namely, matings between red-eyed and white-eyed flies. If a white-eyed male be mated to a red-eyed female, all the offspring of the first (F_1) generation will have red eyes. In the next, (F_2) generation there will be three red-eyed flies to one with white eyes, but all of the white-eyed flies will be males, as also will be one third of the red-eyed flies.

If on the other hand, a red-eyed male be mated to a white-eyed female, all the females of the first (F_1) generation will have red eyes like their father, and all the males will have white eyes like their mother. In the next (F_2) generation, red-eyed and white-eyed males and femals will be produced, and all four classes in approximately equal numbers. A slight deviation will occur owing to the fact that females seem to withstand the laboratory conditions better and are more hardy (or as we say, more viable) than the males, and the red-eyed flies are more viable than those with white eyes. A very large number of the mutants of *Drosophila* are of the sex-linked type, and in all such cases the results fall consistently into the scheme just outlined for white eyes.

In the case of most of the mutants, when a cross is made to normal, the normal condition is dominant. This leads to some results that before the development of Mendel's theory would have been quite unintelligible.

For instance, among the two hundred or so races of *Drosophila* that have been produced there are several that look so much alike that they are indistinguishable in outward appearance. For instance, Black and Ebony are nearly so. It would seem probable on a priori grounds that when these forms are crossed, the offspring should be also black. This is not the case. The offspring are gray like the wild. Again, in the case of two very similar wing mutants, Spread, and Curved, neither of which can fly at all, the offspring do not hold their wings out at an angle from the body, but have normal wings and are as able to fly as is the wild species.

Other experiments show that it is not necessary for one or the other character to be dominant. For instance, if a white-eyed fly is mated to one with eosin eyes, the offspring of the first generation have an eye intermediate in color, and in the next generation, pure whites, pure eosins, and intermediates again occur.

The results of the occurrences mentioned at the beginning of this paper, the rediscovery of Mendelism, and the publication of "The Mutations Theory" can hardly be estimated so soon. If no other importance be attached to them, it is at least worth while that largely through them, the study of heredity has come to take a recognized position as a laboratory science rather than as a promising field for ingenious speculation.

ACQUIRED CHARACTERISTICS.

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On August 6, 1914, August Weismann, professor of zoology at Freiburg since 1867, died at the age of eighty years. Weismann's name is inseparably connected with the controversy regarding the inheritance of acquired characters, and it seems fitting at this time to review the almost revolutionary changes in biological thought which have grown out of his theories of heredity and evolution—changes which may profoundly affect our educational theory and practice.

I. *Lamarck's Theory: the Inheritance of Somatic Modifications or "Acquired Characters."* The problem of heredity is inseparably connected with the problem of the method of evolution. Lamarck, in 1809, gave the first notable theory in explanation of the method of evolution. His theory comprised two main points: (a) in the individual body or "soma," organs are modified through the effects of use and disuse, and to some extent by the direct action of the environment; and (b) these modifications or acquired characters are heritable, reappearing in the offspring.

Examples of the effects of use and disuse on the development of organs during the individual lifetime are familiar to all. The muscles of the right arm of the blacksmith are developed by exercise; callosities are developed on the palm of the hand of the laborer; bones have ridges developed upon them as the result of repeated muscle pulls. Conversely, the limbs of the paralytic become weakened and shriveled as a result of lack of exercise. Almost any organ of the body may be modified as the result of active use or extreme disuse. Moreover, modifications of the body may be produced through direct response to external agencies (e. g., a coat of tan may be produced by exposure to the sun). These are facts which no one disputes. It is the second point in Lamarck's theory that has challenged criticism—the assertion that such modifications are heritable and thus may be cumulative through a series of generations.

Illustrations of the supposed working of this principle are: The long neck of the giraffe is due to generations of stretching in reaching for foliage

on trees; the long legs of wading birds are produced and extended by stretching to keep above water. Scales, plates and hair on the integument arise through the need of protection; horns arise through the need for weapons of offense; the dark skin of the negro is due to many generations of exposure to the tropical sun. On the other hand, the loss of power of flight in the "wingless" bird of New Zealand is due to disuse of the wings; the loss of sight in the mole and in blind cave animals has arisen from disuse of the eyes.

One of the chief requirements of a theory of the method of evolution is that it shall explain differentiation of structure along adaptive lines—that is, how a race of animals becomes better adapted to its environment, or adapts itself to a changing environment. Lamarck's theory attempts to do this in a manner that is almost naive in its simplicity. Most of the activities of animals in their natural environment are adaptive. Animals often chased by enemies become fleeter by practice; animals that fly or dive or leap come by constant practice to do these things better. If such effects are inherited we must have rapid evolution along adaptive lines. If the environment changes the activities of animals are directed along new lines in order to meet the changed conditions, and changes of type result. But there are hosts of adaptations that Lamarckism cannot explain.

The use of the term "acquired characters" in speaking of the Lamarckian factor in evolution is rather unfortunate, since all characters new to the race might be said to be acquired. Thomson has proposed as a substitute the term "somatic modifications," which is better; but the older term has become so firmly fixed in the literature that it cannot be ignored.

II. *Weismann's Theories.* We will assume a knowledge of the facts embodied in the now universally accepted cell theory, according to which every plant and animal is made up of minute structural and physiological units called cells. Certain of these units, the germ cells, are capable of giving rise, by repeated division and growth, to new individual organisms.

A. *Segregation of the germ cells.* The older view was that the germ cells are a part of the body and are produced by it; the organism simply detaches a portion of its substance to form the germ of a new individual. From his studies on coelenterates, Weismann, aided by an observation of Klenenburg's, arrived at a new view of the germ cells. Kleinenburg observed in living hydroids that the germ cells crawled about from one body layer to another, behaving like living amoebae parasitic on the hydroid. This and other observations convinced Weismann of the segregation (separateness or apartness) of the germ cells; they receive their nourishment from the body, but do not enter into its activities. The body is the house in which the germ cells live; they dwell in the body, but are not a part of it. The body simply holds them in trust, as a store of germinal material that may give rise to future generations of bodies and germ cells. The germ cells, as well as the bodies that arise from them, are entire organisms.

Evidence has accumulated to show that Weismann was right in assigning a large degree of independence to the germ cells. Recent studies on both invertebrates and vertebrates have shown that the germ cells are distinguishable in early stages of embryonic development, and that they undergo extensive migrations before they become lodged in the reproductive organs.

This conception of the segregation of the germ plasm led Weismann to the most important and fundamental conclusions regarding the role of the germ cells in heredity and evolution.

B. *Germinal continuity.* A second step in the development of Weismann's theories was the establishment of the principle of germinal continuity.

Both body and germ cells arise by the continued division of a germ cell, the egg. But there is this difference in their fate: the body dies, the germ cells live to give rise to new generations. The germ cells are thus potentially immortal: so long as the conditions of life remain favorable they will continue to produce new bodies and new germ cells. There is thus a continuity in the lineage of germ cells, but in the body cells this continuity is broken by death. We may trace an unbroken succession of germ cells, of which the body cells of successive generations are the side-products.

The conception of germinal continuity is illustrated most simply in the case of animals which reproduce asexually by parthenogenesis. Weismann illustrated this by analogy, using the manner of growth of the fern. This plant has a horizontal rhizome or rootstock, an underground stem, which grows and advances at one end by means of an apical bud. Each year it puts up a leafy shoot, which flourishes for a season, but in autumn withers and dies; the rootstock lives on, to give rise in succeeding seasons to other leafy shoots which share the fate of their predecessors. The perishable leafy shoot may be compared to the body or soma, the perennial roostock to the lineage of germ cells.

The same conception holds for sexual reproduction, with the complication that the germ cells of the two sexes must unite to form the fertilized egg, a duplex cell which gives rise to the next generation.

This conception of the continuity of the germ cells, added to the principle of their segregation from the body cells, is made the foundation of Weismann's general theory of heredity. The reason for the resemblance of offspring to parents is that both have arisen from a common germinal substance. This relation is expressed by the paradox that parents and offspring are brothers and sisters of the same ancestral stock—in other words, they are chips from the same block.

The conception of the continuity of germ plasm is more than a theory—it is an observed fact, which must be made the basis of any theory of heredity.

C. *The non-inheritance of acquired characters.* One of Weismann's corollaries from his theory of the segregation of the germ plasm, coupled

with the fact of germinal continuity, is that acquired characters are not inherited. To be inherited, modifications of the body must in some way be impressed upon the germ cells, and a mechanism has never been demonstrated by means of which this could be brought about. The facts of structure and physiology indicate rather that characters that originate in the body remain with the body and die with it. Hence the effects of use and disuse in modifying the organs of the body, and modifications of the body due to the direct effects of the environment, are not to be assumed to be inherited, unless one can bring forward convincing experimental evdence that such is the case. Weismann sharply attacked the Lamarckian position, and showed that much of the evidence upon which it was based is untrustworthy. The problem concerning the inheritance of acquired characters became the central problem of biological research, and on this question the biological world came to be divided into two hostile camps. Space will permit us to give brief accounts of only a few of the many ingenious and careful experiments designed to test the validity of the principle of the inheritance of acquired characters.

1. *Experimental evidence.* (a) *Evidence from mutilations.* It is a matter of common knowledge that mutilations are not inherited. Considering all the mutilations that members of the human race have experienced, from accident, warfare or deliberate intent, it is clear that, were these effects inherited, all the offspring would be born in a fearfully mutilated state. Some specific instances of the non-inheritance of mutilations may be given.

Chinese women of the higher castes have bound their feet, for the purpose of dwarfing them, for countless generations; there is no evidence of inheritance of the diminutive size of the feet. Circumcision has been practiced by the Jews for thousands of years, without effect on inheritance. Savages perforate the nose for the purpose of wearing nose-rings, and civilized women, until recently, perforated the ears in order to wear earrings; there is no inheritance of these mutilations. Weismann cut off the tails of mice at birth for nineteen generations, without changing the inherited size of the tail.

Conklin has summed up the situation by saying: "Wooden legs are not inherited, but wooden heads are."

(b) *Use and disuse.* The record of a single experiment must suffice—that of Lutz on the fruit-fly, Drosophila. Lutz kept the flies, for forty-three generations, in small tubes, where the movements of their wings were restricted. Using large number of specimens, he measured the wings of successive generatons, comparing wing length with body length. In forty-three generations studied, there was no evidence of diminution in the size of the wings.

(c) *Effects of the environment.* Some of Tower's experiments on the potato-beetle were designed to test the heritability of modifications produced by the environment. The potato beetle had its original home along the eastern slopes of the Rocky mountains. It fed on a wild plant belonging to

the same genus (Solanum) as the potato. When potatoes began to be cultivated in the vicinity, it changed to the potato plant for food. This enabled it to spread over the entire country, especially to the eastward; in a few years it had reached the eastern coast. Forty years later, Tower collected potato beetles from various parts of this vast range, and found a marked difference in coloration in different regions: those living in the arid regions of the west were lighter in color than those found in the damp eastern states. The coloration varies from an albinic condition found in the Rio Grande Valley and the southern part of New Mexico to a very dark color found in the Atlantic States. In most species of potato beetle there are two generations a year, hence these differences had been acquired during eighty generations. Such differences in color of the same species distributed through this range have been noted in other animals, and the factor assumed by all to be the most powerful in producing this general color variation is moisture, though perhaps temperature is of equal importance. Tower brought these various types of potato beetle together at Chicago, and bred them there in the same natural environment. The result in all cases was a complete and rapid change to the type of coloration prevailing at Chicago. In all but one or two per cent. of the specimens the change was produced in one generation, and at most two generations were required. In succeeding generations, there was never any tendency to reversion so long as the conditions remained the same. At the same time beetles from Chicago were in experiments subjected to the the same conditions of moisture and temperature that prevail in different sections of America, with the result that in one generation modification to the conditions characteristic of the different regions was produced, and this persisted as long as the conditions remaned the same. In this way Tower modified the general color of beetles at will, prdoucing by experiment the colorations found in nature in diverse habitats. When tested by breeding in a changed environment, these modifications were no more permanent than those found in nature.

In the experimental production of somatic modifications it is necessary to guard against the possibility that the environmental influence acts directly upon the germ cells, producing germinal variations which become apparent as somatic characters in the next generation. In the potato beetle, Tower found the germ cells susceptible to the external influences employed, only during the period of their growth and maturation, which occurs in the adult beetle; on the other hand the period of susceptibilty of the body to external influences extends only through the embryonic and larval stages. By keeping the beetles under unusual conditions only during embryonic and larval stages, and returning them to normal conditions as soon as the adult stage was reached, Tower was able to insure that any resulting modification of the color pattern was somatic and not germinal in origin.

A simple case indicating that acquired characters are not inherited is that the persistent sunburn of Englishmen long resident in India does not reappear in their children born and reared in England.

(d) *Disease.* Many diseases (e. g., tuberculosis) now known to be produced by germs were formerly supposed to be hereditary. Predisposition (i. e., lack of resistance) to the disease may be hereditary, but predisposition, like natural immunity, is not an acquired character. Diseases produced by germs are sometimes congenital (i. e., demonstrable in the offspring at birth), but not hereditary.

There is a widespread opinion, now supported by rigid proof, that alcohol may produce degeneracy in the offspring. Alcohol affects the germ cells directly, giving the offspring a poorer start in life, and the effects may persist through several generations. This is not a case of the inheritance of acquired characters. When alcoholism "runs in the family" it is probably due to the fact that the strain of germ plasm is weak in its resistance to the effects of alcohol, or the stock is peculiarly susceptible to the acquisition of the craving for alcohol. The same thing that caused the father to become an alcoholic, namely, weak germinal constitution, causes the son to do likewise. Imitation may play a part. It has not been demonstrated that the acquired appetite is inherited, or the habit transmitted to the son.

Lead poisoning, X-rays, and radium emanations, may injure the germ cells directly and cause sterility. Anything that impairs the nutrition of the germ cells may affect the offspring unfavorably, but such cases do not come within the category of the inheritance of acquired characters.

(e) *Transplantation of ovaries.* Perhaps the strongest evidence for the non-inheritance of acquired characters comes from Castle's experiments on the transplantation of ovaries in the guinea-pig.

Castle used guinea-pigs of pure breed—i. e., their ancestry was a matter of record, and they were known to breed true. He transplanted the ovary of a young black female to the body of a young albino female whose ovaries had been previously removed, and mated the albino to an albino male. The expectation in mating ordinary albinos is that all the offspring will be albino; the expectation in mating albino with black is that all the immediate offspring will be black. In the case of the experiment, all the offspring, six in number, were black—showing that the body of the foster-mother had not influenced the germ cells engrafted from another animal, at least so far as these particular color characters are concerned.

In this case, to be sure, the particular character considered is not an acquired character, but the experiment aims to solve the fundamental question of whether body characteristics influence the germ cells. Ample time is given for any effect of the foster-soma on the engrafted tissue to make itself felt, for the young were born in three litters at intervals of from six months to a year after the operation. That the evidence is meager is due to technical difficulties: out of seventy-six experiments only one grafted animal had young from her grafted tissues. Castle has since performed similar experiments involving other color characters, with results that accord in principle with the case described. These experiments form a substantial body of evidence in favor of the view advanced by Weismann, that in the

higher animals germinal substance and body substance are physiologically distinct and that the genetic potentialities of the latter are not subject to modification through somatic influence.

2. *Present status of the problem.* Ten or fifteen years ago biological opinion was almost equally divided on the question of the inheritance of acquired characters. Since that time a vast amount of ingenious and searching experimental work has been done, with the result that not a single convincing instance of the inheritance of an acquired character has been obtained, while much evidence has accumulated tending to show that acquired characters are not inherited. Today the great majority of biologists throughout the world agree with Weismann on this subject. But Lamarckism dies hard, and the influence of American paleontologists is still largely on the side of the inheritance of acquired characters. From the nature of the subject, the evidence from paleontology consists of a vast array of cases which *might* be explained by the operation of the Lamarckian factor, rather than in any convincing proof that they *should* be explained by this instead of some other principle. The question can be settled only by properly planned and rigidly guarded experiments on living animals.

A conservative course is to regard the question as still an open one, but with the weight of evidence heavily in favor of Weismann's contention. In discussions of the method of evolution, one can no longer invoke the Lamarckian factor with the expectation that the assumption will pass unchallenged.

D. *Heritable variations are of germinal origin.* The practical failure of Lamarck's assumption of the inheritance of acquired characters has resulted in focusing attention upon variations of germinal origin. For without heritable variations there cannot be evolution—each generation would be obliged to begin its evolution anew; and if these heritable variations do not originate in the soma, then they must arise in the germ plasm. There is plenty of positive evidence that germinal variations occur, and that they are heritable; and the logical consequence of destructive criticism of Lamarck's theory is to force us to the conclusion that all heritable variations are of germinal origin. Weismann did not hesitate to accept this corollary of his theories, and adopted Darwin's views as to the efficacy of natural selection acting on this material.

While we may be willing to suspend judgment as to the ultimate answer to the question of the inheritance of acquired characters, it is obvious, in view of the failure of the persistent attempts to prove such inheritance, that the study of variations of germinal origin offers the more promising line of investigation. If it can be shown that they furnish adequate material for evolution, then the foundation of Lamarck's theory will be weakened if not utterly destroyed.

III. *Some Consequences of the Denial of the Inheritance of Acquired Characters.* A. *It requires us to modify our educational theory and prac-*

tice. If Weismann's contention be true, then the effects of education are not inherited. If reared by his parents, the child of cultured parents will be greatly helped by his environment, but if separated from them he gains nothing from the fact that they were educated. The fact that the parents have proved themselves capable of culture indicates the probability that the child will have a good inheritance, but does not add anything to that inheritance. The education of the child begins only after he is born, and the only control a man has over the inheritance of his children is exercised when he selects his wife.

It seems to the writer that Weismann's theory of the non-inheritance of acquired characters has reached a degree of probable validity which demands that it be taken into account in our educational theory and practice. If the hypothesis be correct, then the resources of our educational system are not being expended in such a way as to secure the greatest benefit to society. It would seem that at present the greater effort is being expended on the poorer material.

What a child becomes is determined mainly by his innate capacities, and education consists largely in applying the stimuli necessary to set going these potentialities, and affording opportunity for their expression. The most favorable environment can do no more than bring out the hereditary potentialities; on the other hand, those possibilities must remain latent unless they are stimulated into activity by the environment. If there is any one fact that is especially impressed upon teachers of broad educational experience, it is that some individuals respond to educational influences more readily than others, and some are capable of developing further than others. Thus education takes the measure of the inheritance.

It is notoriously more difficult and requires a greater expenditure of energy to teach the dull students than the bright ones, and a few dull students are a tremendous drag on a class. If acquired characters are not inherited, then the work of education must begin anew in each generation, and the permanent redemption of the unfit through education alone is impossible. A modicum of education is necessary to make human beings self-supporting and acceptable members of society, but the attempt, by spectacular appeals to the interest or by hammer-and-tongs methods of instruction, to make professional men and women out of pupils mentally below par involves a tremendous waste of resources. On the other hand, many students of ability, energy and initiative are denied the advantages of higher education through the force of adverse circumstances. One of the tragedies of life is the "loss of real personalities who have all the natural endowments of genius and leadership, but who for lack of proper environmental stimuli have remained undeveloped and unknown * * * One shudders to think how narrowly Newton escaped being an unknown farmer, or Faraday an obscure book-binder, or Pasteur a provincial tanner" (Conklin). With proper training, such persons are capable of becoming leaders of thought or promoters of vast enterprises, with untold profit to society as well as to them-

selves. It should be the duty of the state to seek out such individuals and give them the best educational advantage obtainable.

B. *It thrusts upon us new ideas of responsibility with regard to inheritance.* The practical collapse of Lamarck's theory of the inheritance of acquired characters does not free us from responsibility for the well-being of the germ cells. We have seen that they may be injured or even rendered incapable of fulfilling their function because of adverse influences—the direct action of poisons and other environmental stimuli. The body is the guardian or trustee of the germ cells—a responsibility which has to do not only with the welfare of our immediate offspring but with the potentiality of countless generations of the unborn.

While we regret that good habits are not inherited, we may, on the other hand, derive some consolation from the non-inheritance of bad habits. But here lurks the danger that we may therefore lose our sense of responsibility for the formation of bad habits. There are other considerations aside from those having to do with heredity, which should guide us in the formation of habits. Bad habits are those which the experience of the race has shown to be harmful, and we are responsible both for the direct consequences and for the example we set to others.

Finally, as regards race betterment the most important consideration arising from an acceptance of the doctrine of the non-inheritance of acquired characters lies in the limitation it imposes on the euthenic factors(education, sanitation, etc.), and the need for some rational eugenic program. Civilization and education are external and not internal factors; they affect the soma and not the germ plasm. Civilization involves the accumulation of environmental factors which are more favorable to the intellectual development of the individual, and which demand more of the individual, than was the case with his savage ancestors. But if the natural ability, the innate capacity, of man has developed parallel with this advancing civilization, it is due to the preservation of germinal variations of the right sort, and not to the direct effect of civilization or education. That so many fall short of meeting the severer tests of modern life is evidence that not all strains of germ plasm have progressed far enough to be adapted to the new conditions, and that, through man's interference, natural selection has not been sufficiently rigid. Does it not, in the words of Galton, fall within the province of man to replace natural selection by other processes that are more merciful and not less effective?

EUGENICS.

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It is with some trepidation that I undertake to speak to you on the subject of Eugenics, for I have been requested by your president to speak safely and sanely for twenty-five minutes. I am not at all sure of my ability to carry out that program; and in case it is necessary to depart from it in some particular, it will be an embarrassing matter to decide whether to stop short of the allotted time, or to abandon safety and sanity.

I shall not take time to give fundamental facts of heredity in man. I might be guilty of perpetrating an anti-climax, after the papers that have preceded me on the program. For the facts of heredity in the human species are by no means as well known as in our cousins, the "inferior" animals. This is not the fault of biologists, but of man's complexity. Human nature is transparent, compared with human heredity. Very few traits behave in regular fashion. Eye color has been found to follow a system, but the system is difficult to apply, owing to the variability of the pigment. Form of hair is a similar trait. Skin color is less regular. Color-blindness behaves according to a fairly definite rule. Among mental traits, feeble-mindedness is a clear case; it is a simple recessive, and a very important one.

Numerous other characteristics show signs of being inherited. Insanity, cataract, nervous diseases, defects of speech, imperfections of the eye, affections of the skin, all run in families.

But it is not enough to know that a trait runs in a family. We cannot afford to take public measures on even the certainty that a characteristic will occasionally reappear. We must know when, that is, under what circumstances, it will reappear. Here lies the difficulty of the Eugenics program. A knowledge of human inheritance is a first prerequisite.

The first step in the movement must therefore be, in my opinion, education. Not popular education, however. That has been one of the mistakes of the early campaign, for the blind have sometimes led the blind, and they have at the same time led Eugenics into disrepute. It is the Eugenists themselves that are first to be educated, they must first be provided with the facts on which to build. This information is being procured through such agencies as the Eugenics Record Office, of Cold Spring Harbor, Long Island, state boards of health, and heads of institutions. They are training field workers, and collecting data from institutions and private families. Perhaps some day *definite* information will be available, perhaps definite laws of heredity may sometime be known for man. If so, it will be worth all it cost in labor and expense.

In the meantime, what can be done? Until the knowledge of human heredity is made as definite as is that of other animals, is there nothing we can do? Is not something definitely enough known to form the basis for immediate action? I think there is, but of the human traits whose heredity is thus known, few are of sufficient social importance to warrant public measures. Fortunately, or unfortunately, those few impose a task of such magnitude that no reformer need be idle. There is one trait in particular that can not too quickly engage the attention of all who wish the human race well, namely, feeble-mindedness.

Feeble-mindedness, with related weaknesses, is a simple recessive. That means that all children of two feeble-minded parents will be feeble-minded. It means that if normal and feeble-minded persons marry, though their immediate families may be apparently normal, the subsequent generations are in danger. Practically all known information supports these statements. The eradication of such a characteristic is a matter of the gravest public concern, and no public measures not involving the actual destruction or permanent suffering of those unfortunate ones now existent, are beyond the right of the majority to put into operation.

Methods of eradicating feeble-mindedness are several in number. Segregation of the afflicted in institutions or in isolated regions, each sex separately, has been proposed. This plan appeals to the sentimental because it is held to be more humane than another plan shortly to be mentioned. It appeals to physicians because it prevents, not only procreation, but also the spread of certain communicable diseases. If sterilization be the plan adopted, the power of release must be carefully guarded. Above all, release must be removed from politics.

An alternative plan for the eradication of feeble-mindedness is that of sterilization. By a simple and comparatively safe operation reproduction may be prevented. This is a cheaper method than segregation. It is likewise less hygienic, in that it allows the spread of venereal diseases to continue. Indeed, it is held by some that the spread of such contagion would actually be increased, because immunity from conception could be promised. Tender-hearted eugenists sometimes declare sterilization inhumane, but this charge can hardly be maintained. Society must value its individual privileges more highly than its collective rights, if this operation is impermissible.

Legislation looking to the betterment of the human race should, in my opinion, be confined to this one defect, feeble-mindedness and its related weaknesses, for the present. Grave errors can be committed by haste at the present stage of the eugenics movement, and these errors are almost certain to react against the whole program. Fostering popular sentiment against the marriage of the feeble-minded can hardly produce any marked results, because the educable portion of our population will not marry feeble-minded persons anyway. Popular education aimed at hastening legislation may well bear excellent fruit.

The program I have outlined is, you will say, negative. Perhaps the term negative is a stigma. But why not negative? It is better to tear down an unsightly bill board, or remove a hideous rubbish heap, even if one can not build a mansion or plant a garden in its place.

Eugenics *may* sometime become positive in its aim. It may be possible at a future day to aim at building up the virtues and the strength of human beings by deliberate breeding, just as now we may eliminate weaknesses by the same method. When we know how, when human heredity is as well known as that of the other animals, there will be time enough then to decide whether it is desirable to do so. No one can predict at the present time whether, or to what extent, it is desirable to produce at will artists, poets, and philosophers. He who thinks it is now possible, whether desirable or not, to create these superior beings, must be regarded as little less than a visionary.

COMMERCIAL CONFERENCE

COMMERCIAL LAW IN THE HIGH SCHOOL.

MR. JAMES C. REED, DIRECTOR STATE COMMERCIAL NORMAL SCHOOL, WHITEWATER, WIS.

Before discussing the teaching of Commercial Law in the High School let us consider the disciplinary value of law as a general study. The study of the law has acquired a time-honored prestige as a means of mental discipline. It disciplines the mind in precision of thought and in logical reasoning. The law is exceedingly precise, and the law student will soon find that he must be exact in his statements and accurate in his processes of arriving at conclusions. Legal terms by long-continued usage have acquired a definiteness of meaning which cannot be ignored and the layman must catch this spirit of exactness. The student misses the best part of his training in the law if he is not drilled in stating facts in terms which admit of no question and about which there can be no doubt. This accuracy of statement is one of the preeminent marks of a trained mind. A man can scarcely be said to possess a high degree of mental discipline, who does not possess this faculty of exact statement. There is no study in the curriculum which is better fitted to develop this trait of mind than Commercial Law. Vagueness and looseness of thought and careless statements cannot be tolerated.

To become proficient in the power of exactness in making statements requires that the student should possess and cultivate the ability to analyze. The law of today is complex, and one principle is based upon another, and it is necessary to compare and discriminate in order to obtain a clear under-

standing of even the elements of law. The student must be able to pick out the essential elements in a case where a number of questions are involved, and to center his thought upon the real issue. He should be able to analyze a complicated case into its component parts and to compare the state of facts involved in one case with those of another, and to detect any differences which would distinguish one case from the other. This furnishes a mental training of a high order.

Precision of statement promotes clearness of thought. The essential principles of the law are not so very numerous, but their applications are almost innumerable. To apply a given principle to a state of facts and to contrast different statements of fact in order to evolve the general principles of law, offers an excellent training in reasoning.

A Hotel owner and proprietor who is in need of the right sort of hotel manager wrote to the Hotel World on March 27, 1915: "Most failures in business are due probably to the weakness of the average business man. And why? Because the average business man has had no real business training. He starts in the public school, may go through the high school, college, university, specialty schools, and may even take a 'business course' in a commercial institute, but he lands in the *Business* world absolutely unequipped. The professional man, in law, medicine, chemistry, etc., gets first a systematic education in his profession and then a technical training in it, based on well established rules, regulations and laws founded on logic. The young business man jumps into the business world and his technical training is received in the School of Hard Knocks. We boast that we are self-made men, but most of us are mighty imperfect jobs of home manufacture. It is not entirely our fault—we don't know any better. We begin at the top and work down to bed-rock facts and principles instead of beginning at the bottom and working up. What do we mean? Just this: Not one man in a hundred is taught to think logically. O the magic wrought by logical thought! All our knowledge, our education, our technical learning, comes to naught, or is largely failure, unless founded on logical reasoning. We may be disorderly in our habits of life, but the most of us are the pink of neatness physically compared with the disorder in our 'thought factory.' We do not reason from cause to effect—we jump at conclusions, we are the victims of emotion, of impressions, of temperament, instead of orderly, disciplined thought."

This statement may be somewhat exaggerated, but it shows the attitude of business men toward education, and that they feel that if there is any one thing that we should do for our students it is to teach them *How to Think.* The study of law develops the reasoning faculty as much as any other study in the high school curriculum. In my opinion it is the best study we have in this respect.

Law has been defined as the "Essence of reason." Sir Henry Maine has said that "Law is common sense." As the student progresses in the law

he becomes impressed with the reasonableness of it and it unfolds before him as a clear and logical system. The student is encouraged in finding so much that appears to him as common sense embodied in the law. It strengthens his reasoning power and gives him confidence when he finds his own conclusions confirmed by the opinions of eminent jurists, and it directs his thoughts into new channels. He is stimulated to apply the principles he has learned to sets of fact of which he has personal knowledge.

The common sense of the law is shown in another way. This is in the fact that the law assumes that one man will do the same as another under like circumstances. This leads the student to compare human actions and to meditate upon the reasonableness of human conduct in similar situations. He frequently asks the question, "What would an ordinary man do under such circumstances?" The student is given an opportunity to figure out the normal rules of conduct. This constitutes a fine study in human nature, and brings into play the natural inclination of the high school student to "size up" individuals. No one can take your measure, or estimate your value more readily and accurately than a high school student. There is an excellent chance to exercise this faculty of estimating human conduct.

In the study of contracts, the student learns that it is the purpose of the law to carry out the intentions of the parties, but that their intentions are very often not expressed in clear and unmistakable language. That certain rules of law have grown up which have no other purpose than to establish normal rules of conduct. These rules are based on the assumption that one man will act the same as others under like circumstances. In arriving at the intentions of the parties, the question arises, "What was the reasonable, common sense idea which these parties had in mind when the contract was formed?" "What could they reasonably expect of each other under such an agreement?"

Law also constitutes a good exercise for the memory. It is necessary in acquiring a knowledge of the fundamental principles of the law that there should be some work which involves the use of the memory. The student must recall a state of facts with accuracy, and the principles which would apply to such facts. If an essential element is not remembered, often times the whole application is inaccurate and misleading. The student must be able to reproduce an exact picture of the transactions involved in the case. The more accurate he can do this the better qualified he will be to make a proper application of the principles involved in this case to another set of facts.

A common fault with the beginner in the study of law arises from his inability to distinguish cases from each other which are only superficially alike. He is inclined to draw the same conclusions from a set of facts which are only slightly dissimilar from a layman's point of view but which are altogether different in the eyes of one who has had experience in applying legal principles. The student soon discovers that he must be able to

draw fine distinctions, and to analyze his facts and apply legal principles with discrimination. It is often hard for the novice in law work to see any difference between two cases in which the judges have arrived at opposite conclusions. I do not know of any study which will train the student in the abilty to draw intelligent distinctions as that of a study of the law.

The faculty of imagination is also trained by a study of the law. It seems to students sometimes that a case has been decided in favor of the wrong party, and that the principles of the law have been erroneously applied. When he considers the case further, and follows the opposite holding to its legitimate conclusions he discovers why the case is properly decided. This requires an exercise of the imagination, to carry out in the mind's eye the results which would follow from deciding the facts under consideration in a certain way. Another exercise of the imagination is involved in seeing the reasonableness of an opposite decision at different stages in the development of society. Because a decision was one way in feudal times does not mean that it would be either sensible or just in the present state of society. It might even be unjust under present conditions. The student who does not possess the faculty of imagination will not be able to get a clear understanding of cases of this kind.

The question arises, is a study which involves in such a high degree the faculties of precision, analysis, reasoning, memory, imagination and discrimination, a suitable one for high school students? Some High School principals object to the teaching of commercial law in the high school on the ground that it is too technical and difficult for high school students. These principals are honest in their opinions and have probably drawn their conclusions from the way in which they have seen the subject taught in some high schools. The fact, however, that a subject has been poorly handled in certain cases is not a legitimate reason for condemning the study. Many teachers of commercial law fail to get the proper viewpoint in presenting the subject. They do not comprehend what the object of a course in commercial law should be. It is not the intention that the high school student should be trained for admission to the bar, or should go into the study in a technical way with a view of mastering all the intricacies and fine distinctions of which the subject is capable. It is rather to give the student a sufficient knowledge of the law to enable him to act intelligently in business affairs. An educated man of the world should have at least a general knowledge of the main features of the law. Such a knowledge is essential to the well informed man of affairs. Such a knowledge does not require that the law should be studied as an abstract science and in a comprehensive way. It is not necessary that the man of affairs should be able to give expert advice but rather to enable him to judge when he needs the services of an expert lawyer. To impart such a general knowledge should be the object of a high school course. Such a course can be carried out without making a study of technical cases, or of going into the subject to such an extent that the ordi-

nary high school student would be lost in a maze of fine distinctions. There are two classes of teachers who do poor work in commercial law, one class because they know too much law and the other because they know too little. I have no objection to a teacher who has an expert knowledge of law providing he also has a sufficient grasp of the principles of psychology to put his knowledge in teachable form, and further providing he knows the limitations of the high school student. It is a high art to be able to recast one's knowledge and to put it in such form that it will be readily understood by immature students. This problem is involved in any kind of teaching, and it is a common maxim of good pedagogy that the subject matter should be within the range and comprehension of the students for whom it is intended. The inexperienced law school graduate is the worst offender in this respect. He thinks it to his credit to go into the intricacies of technical cases in order to impress his students with the depth of his knowledge, and also because recasting his knowledge in easy, comprehensible language is hard work. Another class of teachers who do sorry work in commercial law is the teacher whose knowledge of the subject both from a theoretical and practical standpoint is very limited. Her knowledge of the subject consists in partly knowing what is in a small text-book. This enables her to ask the questions at the end of the chapter without the necessity of *always* looking back at the designated paragraph in order to judge whether the student has answered correctly or not. Such a teacher usually considers it rank heresy for a student to venture to inject into the lesson some question which is not found in the book, and looks with disapproval upon any student who allows his curiosity to so far lead him astray as to wonder if it would make any difference in the decision if the facts were varied a little. Between these two extremes we have some teachers who are doing excellent work in teaching commercial law to high school students.

There is nothing inherent in the study when properly presented that would place it beyond comprehension of seniors in the high schoool. It is no more difficult than geometry or physics. There is this to be said, however, there is no study in which the teacher counts for as much as in teaching commercial law. He must know what to include and what to discard. He must exercise a fine sense of discrimination in the choice of his material. His teaching must be definite, practical and interesting and above all he should possess unbounded enthusiasm. His knowledge of the subject should be of such wide range that he would not be embarrassed by any question which the ordinary student could present to him in a practical way. In fact questions should be encouraged and the student should be advised of the fact that it is sometimes impossible to answer abstract questions of law offhand. That is the practise of trained lawyers to withhold their opinion until they have had an opportunity to look up the law. The student can also be impressed with the fact that a seemingly very simple question in law may be exceedingly hard to answer. Such questions often involve the deepest principles of jurisprudence. For example, the keeper of a restau-

rant moved to another town and after he had opened his place of business he desired to put up a long board sign with the word "restaurant," painted on it. There was a city ordinance which prohibited anything but electric signs to be displayed in the city. It was a suburban town and the citizens desired that the streets should make a good appearance. The keeper of the restaurant put up the board sign and the city marshal took it down. Let us see what is involved between these parties? It seems like a simple question, but before you can answer it you must study into the limitations of the police power of a city. How far can a city upon which police power has been conferred by the legislature go in curtailing the rights of the citizen to pursue his business in his own way? When students understand that even a very simple question may go down to the very foundations of our institution, they will not feel that they have brought any special disgrace upon the teacher because he was not able to answer all of the questions they might propound to him. They will also see that men may honestly differ in their opinions upon a legal question. The teacher can show that the judges of the Supreme Court often differ in their opinions about what should be decided upon the same state of facts. So it is not to be wondered that all members of the class may not be able to see a decision in the same light, or that the opinion of the teacher should seem strange to some of them.

In some way the teacher must secure the confidence of the students. The best way to do this is *to know the subject*. A student always has an admiration for the teacher who is invariably well prepared. This preparation includes both a general knowledge of the subject and a well prepared lesson for the day. As I heard a prominent educator say the other day: "We can not all teach alike." This is true. We have our individual characteristics. Your way can not be mine. Some teachers can conduct a recitation better sitting down, others standing up. Some like to walk around. It seems to give an outlet for their nervous energy. Some can use the socratic method effectively, others can not. But of one thing we can be sure, and I base this opinion on two years' experience in inspecting the teaching of commercial branches in the high schools of Wisconsin, the teacher who *"has the goods"* rarely fails to maintain interest or secure results. By "having the goods" I mean one who knows the subject thoroughly. Who is at home in the subject. Who can inspire confidence in the class, and direct the trend of the lesson into almost any channel. Sometimes recitations may take quite a different channel from what was intended when the lesson began. One should always go to class with a definite course of procedure in mind, but need not always follow it. As a rule I begin by quizzing on the lesson of the day before or I may go back and bring up a subject we had several weeks ago. The course of the quiz may be shifted into another channel by a question either asked by myself or by some student that brings to light a misconception, or a weak spot in some part of the work. I will then go ahead and clear up matters either by lecturing on the point involved or by quizzing until I get the matter straightened out, and when every one understands I go ahead.

I am not particular what method a teacher pursues, if he evidences a mastery of the subject, skill in its presentation and is getting anywhere. I am willing to let him do it in his way if he is really making progress.

I insist, however, that in teaching commercial law, the first thing is a *mastery of the subject.* We can not teach what we do not know. "Knowledge is power" is a true adage in presenting a difficult subject to young students. The only danger is that the teacher must keep down to the student's level.

It is no use to give learned lectures which your students do not understand. I do not care where a teacher secured his preparation so I am *sure he has it.* Now what can a teacher do who is not a graduate in law, and has taken the subject because the program could not be made out in any other way, (which is all the excuse the principal needs to give in order to shoulder the burden on you,) what can the teacher do who feels a little shaky as to his ability to do himself justice because of his inadequate preparation? It is a good idea to form the acquaintance of some law librarian or some lawyer in your local town to whom you can go and talk over difficult points. In most any country town the local practitioner has the time and the disposition to lend you assistance. On matters involving the general principles of law, these man are often well posted although they may not be as up-to-date in many respects as the city practitioner. He can guide you around a lot of pitfalls, and keep you from making some absurd mistakes.

An active lawyer may be able to give you some live examples in the application of the law that will arouse an interest in the class and inspire confidence. Lawyers are glad to do this as it refreshes their memory, etc. For students of this age apt illustrations which illumine the points of the text are absolutely necessary. Moreover, such pupils will remember a principle of law when it is coupled up with an apt illustration much longer than when it is presented merely as a principle and learned by rote. Any one who understands the principle of association will see my point here. Take the questions of Mistake, Misapprehension, and Fraud. Good illustrations of what constitutes a mistake, a misrepresentation, or a fraud will do more to clinch a clear idea of what is meant by each of these terms than any amount of drill on learning the definitions. This *Ability to illustrate the text is vital,* and the teacher who does not know enough law to do it, will have poor success with high school students. There will be neither interest nor progress. An interesting case pointedly stated will arouse intense interest. Some member of the class often knows of a similar transaction in which his father or some friend was interested. The teacher should be able to turn such cases to actual account and cash in on them for all they are worth. If Mary's father has sold the goodwill of his business, and Jennie's father is a pawnbroker, and John's Uncle is an Innkeeper, and William's Cousin is a contractor, you will not get very far in the study of the law until this local color will begin to pre-

sent itself and the teacher should be able and anxious to utilize such material to the fullest extent.

I think also that even in high school work each student should study and present to the class several well selected cases. It is possible now to get a selection of good cases covering the entire field of commercial law in one volume at no great expense. Prof. Bays of Northwestern University has prepared such a volume, published by Callaghan & Co., of Chicago. Such a work can be used to good advantage.

The teacher of Commercial Law has a splendid opportunity to assist the English teacher right here. A student is asked to read a case and report on it. See that this report is made in clear, direct, and forceful language. Quiz the class after the report and see if the matter is perfectly understood. If it has not been, make the student try again until he does make the presentation in a convincing way. This gives good practice in oral English and cultivates the ability to speak to the point on one's feet. It is an extremely beneficial exercise when properly conducted.

References in the local papers to law cases may be turned to good account in arousing and maintaining interest. The class may be able to bring legal papers from home which are of an interesting character. Sometimes documents several hundred years old will be brought in, and add to the interest by their unique character. Old deeds, old wills, anything of this character will prevent the subject from becoming dull. Copies of mortgages, bonds, land contracts, chattel mortgages are not hard to obtain. In this way no exercise need ever be dull, or unprofitable. It prevents deadness and routine.

Keeping in mind the purpose of the high school course; namely, to familiarize the student with the important principles of the law which pertain to business; to give them such a knowledge of legal rules that they may be prepared to judge when they can safely decide a legal question for themselves and when they need to hire an expert opinion; to give them the ability to intelligently use legal and business papers; to develop the habit of caution and deliberation in entering into legal relations; to cultivate precision in thought and accuracy in statement in business affairs; if we bear these things in mind we can judge more intelligently what the nature and the content of the course should be.

1. A brief introduction to the study, showing the development of decisions from the common law, and the growth of our statute, as a readjustment of the common law to our present social and economic conditions.

2. A thorough study of contract law. This subject should receive careful attention. The fundamental principles upon which contracts are based, mutuality of consent, offer and acceptance, the formation, operation, interpretation, and discharge of contracts, should be studied with care. Show that the basis of contract law is common sense, and that the purpose of the law is to carry out the intentions of the parties. To this end certain rules

of law have been formulated to assist in the interpretation of terms that are ambiguous, or indefinite. The pupils should also be taught to apply the principles of contracts to simple cases. They should also be made to understand that all that is to follow in the way of commercial law will be to some extent a review and a new application of the principles of contract law, and that therefore, these principles should be thoroughly mastered.

3. The most closely related subject to contracts, namely, *agency,* should be taken up next. This subject will be easy to teach if contracts have been thoroughly comprehended. The law of agency is interesting as it is so closely related to the lives of the pupils. Practical examples from personal knowledge can be freely used here.

4. Agency should be followed by partnership. This is an important subject to the business man and is not difficult to comprehend.

5. Next I would develop sales of goods, or personal property. It might seem that this should follow contracts but on account of the difficultness of the subject I would defer until after agency and partnership. Care should be taken here not to go too extensively into fine distinctions, nor to confuse the student with too many conflicting opinions. Simple examples should be used and if possible those most closely related to the lives of the students composing the particular class.

6. Bailments should come next including innkeepers and common carriers. These subjects lend themselves to illustrations that are easily understood and these should be freely used.

7. I would follow bailments with negotiable instruments. This subject has been deferred until this point on account of the technicality of the subject in order to give the student an opportunity to get some hold on a legal vocabulary and to have had some experience in legal reasoning.

8. A brief study of corporations. I would not endeavor to go into this subject extensively. Partnership law can be reviewed in bringing out the differences between the two forms of organization. This can be done effectively in parallel columns. The common law principles underlying corporate organization is about all that should be attempted.

9. A concise study of insurance would be my next step. This should include only a knowledge of the general principles, and something on the nature of the different forms of policies to assist the student in the intelligent use of insurance in his own protection.

10. Lastly real property. This should be studied from a practical standpoint and with no attempt to master all the intricacies of the subject. Enough of the subject of title and real estate mortgages to enable the student to intelligently seek expert advice on these subjects as occasion demands. Landlord and tenant can be taken up more fully.

I am aware that very few of us will ever agree upon the order of presenting legal subjects or the relative amount of time which should be de-

voted to each one, but I have given my views in the hope that they might be at least suggestive to some and help to clarify your own ideas on the subject.

Methods of Teaching Commercial Law to High School Students.

1. The lecture method. This method is not very well adapted to the needs of high school students. At this age pupils need definite work every day, and as a rule they are not good note takers. They have not the ability to pick out the important points and to get down the *meat* of a lecture in a few words. They are also eye-minded and do not grasp ideas readily by ear. In any event the work should be based upon a good text-book and the class should be quizzed every day.

2. The case method. The study of adjudicated cases from which the principles of law are to be formulated is too difficult for the average high school student. It requires more time than an ordinary high school pupil has to devote to it. This method is all right for law schools but because of the immaturity of judgment of high school students I do not think it is desirable to use it. I believe each student should make a study of a few cases during the course but I would not depend upon this method alone.

3. The illustrative method. The basis of this method is a good text-book which states the principles of law in clear concise language with as few technicalities as possible. The text should be written in a precise, explanatory style. The text should be filled with illustrations of the legal principles under discussion. If the text does not contain such illustrations the teacher should be prepared to furnish them either by a hypothetical case or from an actual case. In most instances it is best to use a judicious mixture of both actual and illustrative cases. The success of the work will depend largely upon the ability of the teacher to furnish interesting and practical illustrations. As I have stated before there are many sources from which these illustrations may be drawn and many ways in which they may be applied.

Reviews.

There should be frequent and thorough reviews. The best results will be obtained by using problems to a large extent in these reviews. By this I mean the application of a legal principle to a concrete state of facts. Let the purpose be to develop clearness of thought, alertness, caution, deliberation, and independence.

Summary.

The success of a course in commercial law depends largely upon the teacher presenting it. In the hands of a skillful teacher who is well versed in the subject it is one of the most interesting, helpful, and practically valuable subjects in the curriculum. In the hands of a poor teacher it is worse than useless, since the pupils soon lose interest because of the lack of confidence in the teacher, and most of the impressions they get are erroneous, either because the teacher does not know the law, or because the pupil was

not sufficiently attentive to understand it. The failures in this subject, however, from poor teaching is no worse than those made where a poorly prepared teacher tries to teach physics or chemistry or biology or any other difficult high school subject. There is nothing inherent in the subject when properly presented to put it beyond the ability of high school students.

PHYSIOGRAPHY CONFERENCE

PHYSIOGRAPHY IN PREPARATORY SCHOOLS.

MR. E. M. CLARK, FERRIS INSTITUTE.

The homely expression, "sink or swim, survive or perish, live or die," is aptly applied to Physiography as a factor in the High School curriculum. If the subject has fossilized and become obsolete, the panacea offered is a course in General Science.

The Modern Secondary School (High School) must have for its aim the fitting of its pupils to be useful members of society, capable of exercising to rightful ends, the powers developed by an advanced course beyond the grammar school grade. This fact is more forcibly felt when we stop to realize that only about one-tenth of the High School pupils ever take up advanced training and about one-third of these graduate from a college or university. The Secondary School curriculum must be so adapted as to be of use to the majority and yet lay a foundation in each study for advanced work in a college course.

The college or university entrance should be such as to meet the demands of the business world. There is an old idea that in pursuing a High School, College, or University education a person is isolated from the affairs of life. A student may play a negative part but, nevertheless, at any moment must be ready to serve when called upon, or, in other words, to lessen the gap that has long existed between school and life.

Physiography within the past fifteen years has taken a decided advance over its old form both in the material considered and in the manner of presentation. In fact, all Secondary subjects have been affected in nearly the same manner. The day of mere memorizing, making an encyclopedia of unrelated material, has passed, and the development of power, the ability "to do" has in a large measure replaced the old conditions. Today the desire for the vocational studies of Manual Training, Domestic Science and Agriculture, takes advantage of the students desire "to do" something—the pupil likes to see the concrete result of his work.

The Place.

In teaching Physiography, it is prudent to place the study in the first year of the High School course where it can readily connect with the Grammar School course in Geography and also prove of greatest value to the kindred sciences and social studies.

The Aim.

Shall we pursue the study entirely from the standpoint of a college entrance? Personally, I feel much can be gained from the study from the practical as well as from the disciplinary and cultural standpoints. The ability to trace, in the large, the relationships between the most important geographic forms and geographic processes, and to appreciate the responses which human life everywhere makes to its physical surroundngs is the aim in Physiography.

Method of Presentation.

The recitation, lecture, laboratory, and field work are all placed at our disposal. How often is it true that the recitation work is nothing more than a mere jungle of words leached out of the text-book, the thought given, having little or no significance to the topic under discussion or the development of the subject as presented that semester? The teacher many times looks only for the abstract results and forces the class to a sort of stereotype view of the subject in order to meet a so-called entrance requirement and allow the pupil to make a certain grade. Geography should mean more than this.

Lecture Plan.

If a teacher uses the "cut and dried" lecture plan in the Secondary School, there is a tendency to make the work ambiguous and meaningless, talking over the heads of the hearers. By using this method, he often deprives the class of asking questions which would help to remove a confused mass of ideas. Telling, is not teaching, it often crushes the initiative in a pupil. When a school is so equipped as to have a stereopticon, a teacher can use the same to advantage as a review—for illustration, in glacial study a series of views showing the glaciers at a distance, then the parts of the sheet, the work of destruction, construction, etc.

If a lantern is not available, a teacher may resort to postal cards, models, illustrations, and diagrams., I have found these of excellent service.

The Laboratory Method.

Physiography, in order to hold its place in the curriculum, must be developed by the laboratory method. Let what ever experiments are performed be of close relation to the classwork, be sure and utilize the results and not allow it to be a mere method of idling away time in order to meet some requirement. Better discard it entirely than to use haphazard methods. The use of the U. S. G. S. maps has proved an untold blessing to the teacher. They cannot be classed as "chinese puzzles." For example, take

folio No. 155 (Ann Arbor) or the State Geological maps and folios in the series of 1907 and 1911 and you can actually put new life in the class. Michigan becomes a reality. The map, especially, connects the human or social feature with the topography and it no longer remains a flat, inanimate diagram traced in brown, blue and black, but becomes a part of the world in which the pupil lives and a reality just as much as a map of his own environment—a world-wide field study.

In the study of the movements of the atmosphere, weather and climate. the laboratory is a necessity. The weather map offers many useful problems in bringing out the casual relation between temperature, pressure, rainfall, etc. The same method can be applied to the ocean, a concrete relationship between man and his environment can be readily seen. Many valuable problems can be worked out by use of the globe.

Field Work.

The one phase often sadly neglected is field work. One reason is that it requires the time outside the school hours. I can assure you one-half day spent on Saturday in river study, in a lake basin, or in the drift, will amply repay one for his time. The teacher should carefully study the relief of the region beforehand, prepare a list of questions upon the problems presented and place a copy in the hands of each student. Allow each one to make out an individual report illustrating by diagrams and snapshots—this may act as a basis in grading the work of the pupil.

The note book should be a record of his observations and conclusions from laboratory work and not a copy of the matter given in the text-boook.

In each of the above methods, have a defnite aim and a close relation existing between each. If the work is properly carried out, the pupil should realize that his environment becomes a part of the world-wide field study, he has gained a knowledge of regional geography which will aid him in his future readings. Historical movements are more easily explained, pictures or diagrams mean more, his power of careful observation has been trained, as a basis for future work in sciences.

Relation to Other Sciences.

Dr. Chas. McMurry makes the following statement: "In some of the principal schemes for correlating studies geography has been regarded as the mother study, the one that would naturally be the center in any plan of concentration."

In the application of the natural sciences, James Bryce summarized the relation to geography as follows: "All branches of knowledge which have anything to tell us about the earth more or less hinge into or are connected with geography, or you may if you like, say they diverge from it a specialized department of that general knowledge which it presents in its connection with the whole. For instance, geography takes account of the solid crust of the earth. The solid crust of the earth is the special subject of three

sciences, geology, mineralogy and palaeontology, which therefore diverge from geography as being specialized branches of the science which it presents in a general way. Then you have a second divergent branch in meteorology and oceanography, dealing with the phenomena of the air and vapor and the closely cognate phenomena of the great masses of condensed vapor which exists on the surface of the earth in the form of oceans. A third branch is that represented by the sciences of botany and zoology, describing the living creatures which find their home and their substances on the earth. A fourth, a little more remote, consists of the sciences of physics and chemistry, which deals with the constituents of the globe and of the forces which move them. The forces which you see in operation on the earth belong to the science of physics, and the study of the constituent elements of the earth, the methods by which they are analyzed and the combinations which they form, belong to the science of chemistry. Even astronomy, although it carries us beyond the limits of our terrestrial globe, is really closely connected with the science of the earth, inasmuch as any terrestrial phenomena are sensibly affected by the phenomena which lie beyond the globe, and cannot be understood without a comprehension of astronomy.

"The whole of this great group of physical sciences, each of them redivided and specialized into numerous branches and departments, springs from geography as the center of the group." If Physiography is studied rightly, it forms a foundation for the more advanced work in the above mentioned sciences—careful map study, reasoning out by geographical problems, construction and interpretation of diagrams, studying and understanding of the text and other references aided by laboratory, lantern, field and class work develop not only a disciplinary but also the cultural and utilitarian side of the student.

In the cultural studies of history, literature, yes, and even economics and sociology—physiography must play a practical part. Many times relations are lost because of the lack of a study of physiography. The life of a people as it develops politically, commercially and socially, is moulded by geography. History is no longer studied as a chronological series of dates and events to be memorized; but the life of a people connected with the other peoples of the world. Study the topography of North America and then begin the age of discovery, settlement and colonization and American History will take on a new phase. What potent factors the plains, mountains, passes, plateaus, river basins and soils played in those early days. This work must necessarily be carried on to explain the growth of our nation. The abundance of resources, organic and inorganic, has placed the United States as a commercial power. Its geographical position has made the nation a world's power in European and Asiatic problems and still has given us an independence.

Such books as, "The Story of the Great Lakes" by Channing and Lansing (The Macmillan Company, 1909)—giving the history of the St. Lawrence Basin; "Influences of Geographic Environment," by Ellen Churchill

Semple (Henry Holt & Co., 1911), closely relates topography with social development. The relationship between geography and history is well brought out in an article by Lyman R. Allen, in the Journal of Geography, Vol. II, No. 8, and should be in the hands of every teacher of history.

One cannot study American Literature and understand it without a regard for geographical and historical influences. So often the geographical relations are lost because the reader or teacher fails to realize the importance of physiography.

The study of Agriculture is now becoming a recognized study in the High School and is very closely related to physiography. The physiographic processes are very essential in order to understand the principles underlying the study. In fact, in some schools, agriculture closes the work in science, requiring the student to have physiography, zoology, botany, chemistry, and physics.

In Commercial Geography again, physiography must be relied upon to establish relation and not allow the subject to be a collection of abstract statistics.

A General Science Course.

Let us assume that General Science is substituted—teachers will be forced to have special training the same as in physiography, physics, or any other subject; or shall we allow a teacher to present the subject who has only a general training? For a teacher to teach well, he must have a liking for the subject. Generally, a teacher will favor the science he likes best, at the expense of the others.

Teacher's Advancement.

Let us keep abreast of the times, see wherein we can better the courses in physiography, carefully plan each lesson, closely connect the various methods of presentation. When books like "Forest Physiography" by Bowman or "Earth Features and Their Meaning," by Hobbs, appear—procure a copy and see what you can utilize in your class. Keep up your list of U. S. G. S. Folios—attend Summer Courses—correspond with other physiography teachers—as to your problems and exchange examination sets.

As teachers of Physiography, let us grow and Physiography will become one of the most interesting and useful of the sciences in a High School course.

PHYSIOGRAPHY OR GEOGRAPHY—WHICH?

SUPERINTENDENT F. W. FROSTIC, ST. CHARLES.

For twenty years physiography has been taught in our secondary schools with varying degrees of success. That the subject has not always proved

satisfactory as a first year science is well known. That the subject has suffered a decrease in the number enrolling in large parts of the country is known. That in many instances it has been dropped from the course of study and other less worthy subjects have taken its place is known. This may be accounted for in part on the ground that inefficient teachers have too often been employed. Sometimes the text has not been suitable. On the whole, however, it appears that we must pay some attention to the material of the subject itself if we would find the real cause for complaint. If we examine the ten or twelve principal texts which have appeared in this subject in the last twenty years and compare with a similar series of texts in botany, physics, or chemistry; we will be struck by the general sameness of treatment and material in physiography and the marked change in treatment and material in the other sciences. Either we must contend that the subject offers little opportunity for improvement, as compared with the other sciences, or admit that it has failed to keep pace with other subjects in development. There has been considerable agitation looking toward improvement in the subject for the last ten years. That there is dissatisfaction all must admit. What is the best remedy? Few are agreed.

Much careful experimentation has been carried on of late on some of the elementary school subjects which has done much to determine what material and methods are most worth while. Nothing however seems to have been done regarding the grade course in geography or the high school course in physiography. In the absence of definite standards based on scientific investigation our inquiry must look to the opinions of a sufficient number of competent judges as to the real merits and defects of physiography or geography in the secondary school. It is not the purpose of this paper to advocate any changes in the present course which have not the sanction of representative scientific school men. It is rather its purpose to summarize some conclusions which may be of service to those interested in first year science.

Without attempting to define either geography or physiography completely, we may include under the term geography everything that involves an idea of relationship between the inorganic elements of the earth and the organic response of these elements. This is a form of Ritter's conception of geography. The study of the inorganic environment in itself, its existing conditions, and the forces and processes which in the past and present contribute toward the shaping of this environment, may be considered as physiography, or as it is sometimes called, physical geography. It will be seen at once that this is but one of the divisions of the whole subject of geography. To illustrate: the gap in the highlands between the Catskills and the Adirondacks known as the Mohawk valley may be explained under physiography as a result of the forces of stream erosion and glaciation which resulted in the formation of a line of drainage for the glacial lakes to the west. But when we explain that the highlands from the Adirondacks in New York to the Southern Appalachians, offered an effective barrier to

westward movement, and that because of this action by glaciers and streams, a gateway was opened through the highlands between the Atlantic seaboard on the east and the plains of the west through which men and products have poured since the settlement of the Hudson valley, and how this has materially affected the growth and development of our country, we are teaching the organic side of geography. Our physiographic knowledge of this gap as an element of inorganic environment is necessary to the full understanding of the organic responses of men which has made this valley a main commercial artery.

Granting this to be true we must agree that physiography may well be studied at the same time as organic geography if we are to receive the best that each subject has to offer to the grade teachers in geography. But from the results obtained it is evident that the pupil has not had sufficient training by the time he enters the high school to enable him to understand many of the simple geographic problems of every-day life. If we contend that most of our work in physiography in the ninth grade will serve to explain the inorganic relation to what the pupil has learned, we must agree that the explanation has usually failed to appear and the pupil has often taken both subjects without suspecting that there is a casual relation between them. If physiography has not succeeded in explaining some of the problems of grade geography, can we expect that it will answer any of the geographic problems of history, botany, or other future geographic questions he may meet?

Since we can reasonably expect but one year to be given to earth science in the high school would it not be well to make this year treat both phases of the subject with the emphasis on the side which will be most valuable to the pupil in the later work of the high school and life? Therefore it appears desirable that only such items of the inorganic side of the environment should be treated which will contribute directly to the explanation of the more practical side of organic distribution and response, for the following reasons:

1. To man, the most important thing about this earth is the fact that it is a human planet. That this is the home of man and that he is dependent upon its organic and inorganic environments for his existence. From the first day of our life here we are subject to great geographic controls. Society itself is a part of this environment. Whether we live on the mountain or the plain, the country or the city, we must adjust ourselves to the conditions we find there. Since therefore geography deals with the fundamental problems of our existence it is worth serious consideration in our earth science course.

2. It serves as a means of explaining our local environment and in this way is most closely connected with the immediate life of the student. This is what the Germans call the "Heimatskunde" or study of the home region. Here is the opportunity to fix in the mind of the pupil the natural conditions under which his region is developing. To illustrate: The region in which I live is one of low relief with low lying sand ridges representing

the shore lines and dunes about the old glacial lakes. The soil is mostly clay with poorly developed drainage near the numerous rivers. The average fall of the river from our village to the bay is scarcely one inch to the mile. When northerly winds prevail, the water rises, flowing up stream. The mean level of the river is but little below the level of the plain. The clay soil is very suitable for brick and tile making and is used very extensively for such purposes. Farming near the rivers is limited because of liability of floods and poor drainage. In a few cases the farmers take chances on the June high water and the economic status of this class of farms is low. In one case of 11,000 acres the land is diked and the farm is one of the best in the state. After Saginaw's "tall whispering pines" had been cut, the agricultural development was slow for the reasons given. The population turned to mining coal, usually sinking the shafts on the ridges. Some land lying far back from the rivers was farmed. The best farm land near the rivers awaits the day when it will become profitable enough to protect it by dykes. Such examples of local geography will serve to give the pupils a view of themselves as inhabitants of the earth and may be studied in every locality. This will aid the pupil to understand the larger problems of geographic control in distant regions.

3. From the fact that this kind of geography deals with concrete knowledge of immediate value, it is more suitable to a first year student than is the more highly specialized and largely abstract physiography. We have appealed to maps, pictures, models, and exercises of infinite variations to make physiography more concrete. Here it appears in something which is concrete and of such value that it must be recognized as being most serviceable to the student.

4. Geography is more serviceable than physiography in correlation with other subjects in the course of study. An excellent foundation for botany may be made by dealing with the wide principles of plant distribution and types of vegetation which geography teaches. The student may be led to view the rise and fall of nations and the development of their institutions in the light of geographic environment, thus closely correlating with Ancient, Modern, and English History. The intense study of our own country will contribute to the better understanding of U. S. History. "Knowledge has educational value only when its connections and relations with great life problems is realized."

5. Geography will do much to remove the cause of complaint by the college of the lack of geographic knowledge on the part of high schoool graduates. Whether in the college or out, a student needs to have a knowledge of men and places and the great resources of his and other countries. From the reading of the daily newspaper to the most intricate problems of supply and demand in the industrial world such knowledge is eminently practical.

What shall such a course in geography include? From the reports of

the committees from the National Education Association, and the Association of American Geographers the following suggestions are compiled:

1. The teaching of such parts of mathematical geography as show most clearly how human life is influenced by the earth and other members of the solar system.

2. First in importance among factors influencing life is climate. Therefore atmospheric phenomena should receive careful attention. The study of weather and the work of the Weather Bureau is to be particularly emphasized.

3. The study of the ocean as a modifier of climate, as an agent in the destruction and construction of land forms, as the source of certain commodities and as a medium for the transmission of the commerce of the world.

4. The larger geographic forms as plains, plateaus, mountains, valleys, rivers, falls, lakes, and glaciers, should receive careful study. Human interests and activities are largely confined to the lands, but it is obviously of far greater importance that we should understand our relations to geographic forms than that we have a thorough knowledge of their evolution, or be able to accurately classify them. Students should be encouraged to discover human response to environment in the home area as this gives reality to the subject and prepares them to work out and appreciate these relations in remote areas.

5. A study of the larger features and resources of our country such as soils, waterways, water powers, forests, and mineral wealth.

6. A knowledge of the general geography of the most important countries of the world.

7. Some conception of how the history of nations have been shaped by the geographical conditions.

Within the past two texts have appeared both containing material which in a general way conforms to the recommendation of the committees. Both texts contribute much toward a better understanding of life problems and the making of better citizenship. But still the great problem of success in geography, as in physiography, lies with the teacher. The subject matter must be such as to serve the needs of the student as a member of society. The text may serve as a guide in a general way. The details must be worked out by the teacher and will be influenced to a large degree by the region and the community in which the school is located. The home locality should furnish the key to the work.

"Physiography or Geography—Which?" The answer is both; with the emphasis on the larger problems of life as represented in geography. There must be less to the technical classification of land forms and more to the elements of life—every-day life, viewed in the light of its inorganic and organic environment. The final goal should be regional geography based on physiography and including the important principles and details of industrial and commercial geography.

ART CONFERENCE

A BRIEF HISTORY OF ART EDUCATION IN MICHIGAN.

MISS ALICE V. GUYSI, DIRECTOR OF ART, DETROIT.

In gathering educational statistics one naturally first turns to the Bureau of Public Instruction. A letter of inquiry addressed to that department at Lansing brought the following: "We have no statistics on the teaching of drawing in the State of Michigan. There has never been a state supervisor of drawing. Our annual report contains a list of the schools giving instruction in drawing and the number of instructors in the subject."

This may not seem very satisfactory but it does inform us that from being a negative quantity drawing has become of sufficient importance to attract attention.

One question asked of the bureau at Lansing was the year when drawing was first taught in the public schools of Michigan. Owing to the absence of any record as to when drawing was first taught in the schools of the commonwealth of Michigan we may assume that it was introduced with the three R's.

The next in line as sources of inquiry were the State Normal Schools, because if drawing was taught in the elementary schools naturally the State Normal Schools would seek to prepare their pupils to become teachers of drawing.

Drawing was first taught in the Ypsilanti Normal in the year 1852, not as a separate study but in connection with local music and penmanship.

The relation between penmanship and drawing can be easily established. Examples of the penmanship of these days, inherited along with the family silver, prove familiarity of the early scribe with curves of monotony, beauty and force and their combination, besides did not those consummate masters of line, the Chinese, as early as the sixth century, include and teach drawing as one of the six branches of caligraphy?

The interdependence of drawing and vocal music is not quite so clear, perhaps it was that the ability to draw vertical lines and swing beautiful ellipses would enable the pupil to write music more skillfully or it might be that drawing was employed as a means of developing an appreciation of rhythm and harmony.

However this may be in 1863 drawing was elevated to the dignity of a separate study and in certain courses two terms of twenty weeks required.

At the present time the Ypsilanti College requires all its general stu-

dents to take two terms of 24 weeks, students of household arts have a requirement of four terms and kindergarten students three terms.

(Please note that 50% more study is required of the kindergarten teacher than of the teacher who is to teach any of the succeeding eight grades.)

In addition to the required courses there are special courses offered in advanced drawing, life, design and blackboard sketching and a Teacher's Course (this I take it means a course for students wishing to specialize in drawing).

There are now six teachers of drawing in the Ypsilanti State Normal College.

An item that cannot fail to interest those present is that the first teacher of drawing at the Ypsilanti Normal School was John Goodison, appointed in 1858. Mr. Goodison also taught geography.

Forty years later, in 1898, the Mt. Pleasant State Normal School appointed its first instructor of drawing, Miss Elizabeth Wightman, the present head of the department, now needing the services of two assistants.

Requirements seem to differ in the several Normal Schools as Mt. Pleasant has a minimum requirement of twelve weeks and a maximum of 24, offering optional classes in composition, design, mechanical drawing, a professional course, blackboard sketching and the history of Art.

Drawing has been taught in the Northern State Normal at Marquette since its foundation in 1898.

A course of twenty-four weeks was required, this has been reduced to a minimum of twelve, with twenty-four weeks in some courses. It offers four or five optional classes.

Miss Grace Spalding, the present instructor, was the first appointed. She has one assistant.

I have received no reply to my note of inquiry from Kalamazoo, this not by way of complaint but of apology, for omission of Kalamazoo will certainly be noticed.

Search into the archives of Detroit gave 1879 as the date when mention was first made of a drawing teacher, John Natus by name. He was succeeded by Miss Myra Jones in 1882. With the exception of a brief period Miss Jones continued as Supervisor of Drawing in the Detroit Public Schools until her resignation in 1903.

In 1882 the Detroit Washington Normal School was established and Miss Jones assumed, in addition to her other duties, that of training the students to teach drawing.

The writer has seen the time in the Detroit City Normal School extended from two to four terms with proportionate increase of time given to the study of drawing.

A serious handicap to the Detroit Normal lies in the fact that no entrance credits are demanded and no examination in drawing required, and a

large proportion of the pupils enter from private schools having had little or no instruction in drawing.

Also there are no optional classes in drawing, which serve so admirably to stimulate interest and to raise the standard of achievement.

Minus the Normal Training School, I imagine the history of art instruction in the public schools of other cities of Michigan is very similar to that of Detroit. Grade teachers are probably expected to perform herculean work by instructing fifty, perhaps a few less, more often a larger number of pupils during the brief period of sixty minutes per week in the rudiments of an art in which individual criticism seems a necessity. That so much that is excellent is achieved should really be a matter to ponder upon. But because there is so much good work done it is hard to forgive poor work.

I have been asked to mention the aims and methods of past art instruction, owing to the anticipated absence of Miss Virginia Jackson.

Methods naturally were fashioned to suit the aims.

I have seen design so frankly geometrical that to anyone but a student of geometry they might have passed for an illustration of some theorem. Ruler and compass held full sway. The beauty of a free hand line apparently was not understood.

At the other extreme I have seen a wave of impresisonism sweep across the land not only of Michigan but across these whole United States, taking form in impressionistic landscapes whose brilliancy would dim a gorgeous sunset.

Drawing from pose, and figure composition was included in a curriculum planned for babes.

There were wonderful drawing books with illustrations which the pupil was to copy on the opposite page.

Occasionally there was some really exquisite pencil work.

In the course of time some one was brave enough to rise and to remind the pedagogical world that there were fundamental principles underlying all art, that some of these principles were closely related to our very being, such as rhythm and balance. One began to hear about space relations and harmony. The principles of drawing ceased to be taught by a ruler and theory of perspective, and children's eyes were opened to the mystery of distance and receding surfaces. The ability to see beauty and the power to produce beautiful things became the slogan. Perhaps the forming of the department of drawing in the Michigan Schoolmasters' Club may be in some measure responsible for the advancement toward saner methods and aims.

This is not intended to be facetious because to paraphrase when wise people counsel together, good must be the result.

Before closing mention must be made to the Detroit Museum of Art and its School.

The Detroit Museum of Art was organized in 1855 by a group of public-spirited citizens, following an art loan exhibition which created great excitement. At the same time, largely through the artist-members of the Board of Trustees, Mr. Lewis T. Ives, an art school was opened in connection with the museum. John Ward Dunsmore was its first director.

After fourteen years this school was closed in 1899, but its influence is still felt as a large proportion of people prominent in the field of fine, industrial and commercial art of Detroit, received a part of their instruction here, while other pupils are scattered from New York to California. Since 1899 Detroit was dependent upon its private art schools, the directors and instructors of which had been in most cases instructors in the old Museum School, until in 1911 the Detroit School of Design was started by a number of public-spirited citizens with the object of training students to earn a living by employment as designers in the numerous industries of Detroit; and also to give the beginning of an art education to those of the youth of Detroit who show marked capacity for creative work, and who can best get their preliminary training at home, thus saving time, expense and perhaps disappointment and failure on going to some larger art center for study. The work of building up such a school is a long process, requiring the devoted attention of an intelligent management.

The city took over the School of Design in 1913 and placed the management in the hands of the Trustees of the Museum, who have given to the work serious thought and attention. Other cities support such schools and consider them essential to the progress of the municipality in manufactures and in education generally.

This school should prove a valuable acquisition to the State of Michigan as well as to the city of Detroit, as it undoubtedly will if the broad spirit of the Director of the Art Museum, Mr. Charles Moore, prevails, and if at the coming election the people of Detroit vote for the amendment to the city Charter which provides for appropriations for the maintenance of the Museum and School.

P. S.—Since writing this report the people of Detroit have voted against the appropriation for the Museum and Art School.

PRESENT RESULTS OF ART TEACHING.

MISS BERTHA GOODISON, MICHIGAN STATE NORMAL COLLEGE.

Returning from the drawing convention at Cincinnati, several years ago, a few of us were wondering why these meetings now seemed to lack a certain zest and undercurrent of excitement or enthusiasm that they for-

merly had. The conclusion was that we no longer had exhibitions or exploitations of some new line of work, a new theory, subject or medium.

Almost everything had been tried and had passed into the realm of the commonplace.

About twelve years ago, for instance, when the convention met at Chicago, every one was enthusiastic over Mr. Dow's exhibition of "block printing" and when he had finished speaking, the paltform was crowded with those who wished to obtain a closer view of his printed textiles.

Another attractive feature of this meeting was the large exhibit from Minneapolis of pottery made in the grades of the public schools. A few years after this Chicago meeting, at Cleveland, it was Mr. Munsell with his new color theory, who was the "lion" of the occasion.

About this time many teachers were making new ventures in water colors, paper cutting, illustrative drawing and nature drawing. Between 1885 and 1895, these mediums and subjects had a hard struggle with public opinion in order to exist at all, and with the freedom which came from their acceptance as a legitimate part of the drawing course, some teachers revelled in almost an unlicensed manner in these forms of art expression.

A prominent eastern teacher held out rigidly against free illustrative drawing when it was so popular, but finally yielded, and even sent an exhibit to the London Art Congress where the unfavorable criticism it provoked justified him in his former opposition.

In the present exhibits of school drawing, a saner, better balanced division of work is shown. At the conventions, the talks and discussions are more general in character. They deal less with individual phases of the work, and are more concerned with the pedagogical aspect of a subject, the relationship of art to other things, the improvement of existing methods, etc. I will give here a few of the topics discussed at these meetings during the past three or four years.

1. A course of study in art for high schools.
2. What art does for life.
3. Thinking in Perspective.
4. The Psychology of Commercial Art.
5. Relation of Art to Industrial Education.
6. Art in the Home.
7. Essentials and Nonessentials in Public School Art.

Last year, at Milwaukee, Mr. Himilick of Wisconsin led in a discussion of the exhibits. He said the results from different schools showed a striking similarity. That if the names of the towns were changed, many a teacher might have difficulty in identifying her own work. He felt the results did not reveal the individuality of the teacher or the child's environment, also that they showed a lack of uniformity in all of the educational forces.

He thought the work was too good, showed an effort toward achievement of results rather than for development. I presume the majority of

art teachers will concede this, but are they primarily responsible, when so much pressure from outside makes them feel the need of making a good showing at State and general conventions.

Another criticism, both favorable and the reverse, comes from the editor of the *School Arts Magazine* who has been receiving pupils' work from all parts of the country or the past ten years.

He says the work has steadily improved in appearance; sheets are better in arrangement and more harmonious in color, more thoughtful in drawing and often show marked originality in design. In the realm of representation, however, they are weak, this he considers the teacher's fault. I do not agree with him entirely. Some of the blame must rest upon those higher in authority.

To secure good results in representation much time is needed for drill, drill in principles as well as in mediums. Walter Sargent says the mastery of mediums gives more freedom to the mind, that drill is necessary to secure the most artistic forms of representative drawing.

What a grammar grade is allowed only sixty or ninety minutes a week for drawing and this time is divided into two or three periods, is it to be wondered at that the teacher takes the line of least resistance, and neglects the Representation work?

Through drawing exhibits, studying illustrations of pupils' work shown in school magazines and educational reports, and through the reading of printed reports of various kinds, one gets the following impressions of the results of public school art teaching at the present time.

The results in general, show a broadening of interests on part of teacher and pupil, that the idea of service is permeating the art courses, and they are being planned with a view to making the work less abstract and more concrete. Art is being made livable, more a part of the child's life in and out of school, in the present and in the future.

The art teacher is more in sympathy with the broader educational idea of the relation of school work to home and social life. He is trying to make his teaching useful. Teachers everywhere are realizing that there is scarcely a school subject or activity that does not demand art. All that is needed is more time in order to fit the art lessons more closely into the school organization. One exhibit at Milwaukee last spring was particularly refreshing and interesting because it showed a relationship between the art course and the school activities. Posters, sketches and cartoons had been made for schoool publications and to advertise public school entertainments. There were plans for school decoration and designs for use in the manual training or household arts departments. Considering further what has been accomplished through art teaching we find that in the primary grades a closer alliance is shown between literature, history and drawing through the sand-table and theater construction. In many places children in these grades are being interested in the decoration and furnishing of miniature homes.

The relation between art and home life and art and industry is receiving more consideration in the public schools now, especially in the work offered in upper grades, high schools and colleges.

Present results also show that the different lines of art work, as construction, design and representation, are becoming more closely allied, this alliance is brought about by unity of purpose because all these various forms of art expression are being presented with a view to their future or immediate use.

Another tendency of school drawing is a greater interest in decorative treatment, especially of plant and landscape. Compositions show a growing appreciation of abstract pattern, of harmonious arrangement and coloring, of lines and shapes. Plant drawing shows more attention to beauty of line and detail Then, it is evident that teachers and pupils are allowing themselves to become more susceptible to outside influences, that help toward artistic rendering and effects. Designs are more in mass, less scattered, more brilliant and rich in color, showing the influence of Austrian and German design. We also see the influence of Japanese art and of fine things shown in our magazines.

What the general trend of art education is, and will be, can be seen by reviewing what is being done in different localities.

In Indianapolis, as we know, the art course lays stress on costume design, house decoration and furnishing, book making and craft work. In Detroit, Grand Rapids and Kalamazoo more and more time is spent on the subject of interior decoration. In the Normal we are multiplying and lengthening problems in costume design and interior decoration. Few, if any, vocational high schools in any large city are without their art courses. Numerous technical high schools are coming into existence where much emphasis is laid on art. In Cleveland the supply scarcely meets the demand. The splendid work done in the Washington Irving high school shows the industrial tendencies of art.

The recent exhibition of high school drawing in New York City showed results that were to many a revelation as to what art teaching in the schools is accomplishing. This exhibit was splendidly hung in the National Academy of Design, and fifty thousand pupils were represented. It was said the problems showed novelty and a high degree of technical excellence, and a blaze of strong, well balanced color. Other comments were that it showed the advantage of doing one type of work and learning to do that well. A two-period course is given each week and only four completed plates in design are expected, or seven in object drawing, for one term's work. Tempera, used exclusively in German schools, was the popular medium, especially for posters. Much of the design work was practical, fitting the pupils to find employment in trades where artistic knowledge and skill is required.

As another indication of the spirit of the times, comes the report of the Pittsburg schools. It said the aim of their art teaching was to make all

beautiful things useful and useful things beautiful so that the art work would not be a fad or veneer in the educational proposition. The report also said there was a splendid spirit of cooperation existing between representatives of the Carnegie galleries, library, Technical Institute and University of Pittsburg, the Art Societies and the work of the Public School. Does this not indicate a common view point as to the relation of art to life and industry?

A report comes from the school of Fine and Applied Arts in New York this fall saying that the school is laying increasing emphasis on the various forms of applied art now in demand among leaders in the business world. It insists art is a quality to be desired in all phases of industrial life. Posters are designed, not only with reference to their decorative effect, but in relation to the possibilities and limitations of the reproductive process. Life drawing is correlated with illustrative advertising and costume design. Throughout, theory and practice go hand in hand. The subject of design ranges from wooden tops to room interiors and their furnishings, to textiles, furniture, pottery, and metal. In the classes where teachers are prepared, courses in interior decoration and poster advertising are given.

The future of art work in the public schools seems most promising. Conditions are becoming such that the right kind of teacher can make it one of the most valuable factors of education, one of the greatest aids in training a child to take his place as a member of a neighborhood or community, and to contribute to the values and the decencies of civilization.

OPPORTUNITIES OF IMPROVING PRESENT METHODS FROM THE EDUCATIONAL STANDPOINT.

MISS LIDA CLARK, MICHIGAN STATE NORMAL COLLEGE.

Few educators now hold that it is the chief aim of art education in the public schools to make artists, but rather to develop self-expression and appreciation for beauty. This appreciation should be developed along the lines that will make the home most attractive. Discontent with the home and its surroundings is one casue for unhappiness. Bad color irritates without one realizing the cause of the irritation. The training of the girl should be in the line of work that will help the home life, for all the girls who enter into industrial life only 7% remain longer than seven years. The work in the school which will bring about the best training should be those exercises which will develop a feeling for beauty in line, in proportion and in color, and an ability to judge.

First of all, whatever the boy and girl does should be done as well as they personally can do it. The value of work well done, and the satisfaction

and pleasure in results may be shown by the beautiul examples of architecture where the successful result can only be accomplished by the honest and loyal work of each man; by examples of wood carving as done in the fire places, choir stalls, old chests and chairs of the Gothic and early Renaissance; by the beauty of simple lines in Colonial furniture, and the wonderful color harmonies of old embroideries; all these leading up to the present time when beauty is again recognized as being essential. Some knowledge of the real processes of manufacture with the fitting of the design to machine production is helpful, so that when the boy or girl reaches the working age, and goes into the factory, as so many do, he may start with the right attitude toward his work.

Dr. Harris says, "The great problems in the industry of the nations has come to be the aesthetic one,—how to give attractive and graceful forms to production so as to gain and hold the markets of the world." The habit of searching for beauty is one of the most important of all. The wealthiest nations are those exporting the manufactured article. The value of the manufactured article is in the beauty added to the raw material by the worker. The greater his ability to combine beauty and utility the more valuable the article. For example clay banks become as gold mines when made into beautiful pottery.

In the up to date factory the overseer, finding a man doing poor work in one department, shifts him from one department to another until he finds the work for which the man is best fitted, not considering the man a failure because he happened to be a square peg in a round hole. In the schools the powers that be have been overlooking the mental and temperamental differences of pupils and have tried to strike an average of human qualities, forgetting that brains differ as much as do faces. The sad part is that after there is no one to shift the apparently dull one into the work for which he is best fitted and in which he might excel. In drawing there is more chance, on account of the great variety of work, to adapt it to individual needs.

In answer to twenty letters sent out to men in many lines of business—bankers, merchants, contractors, superintendents of schools, lawyers—asking what phase of drawing would be most useful to them, some replied that the ability to supplement a description by means of a sketch as a shortcut to a definite understanding of the thing described; others needed an understanding of perspective; others, plan drawing; others who advertised their wares felt the need of a knowledge of good spacing and ability to letter well; and others of pure design. Summed up, their expression stood: For freehand pictorial, fourteen; for freehand mechanical, six, making a total of twenty; decorative design, four; color, three, making a total of seven, standing three to one for representation of some sort, and a big majority spoke of the usefulness and convenience of the pencil. It is such a convenient tool, responsive, full of feeling, though having a short range of values.

At one time the pencil was the only medium used, but now there is so much choice. The pencil for line work, training one to see clearly; charcoal

with its greater freedom, fuller expression, and fuller tone; crispness and decisiveness through the use of pen and ink; exactness by means of the T. square; and color by the two mediums, water color and chalk. Drawing as representation is so difficult that we should not forget that it took several thousand years before it was thought out how to correctly do it. Perhaps it is no wonder that converging lines get tangled. Perhaps some of the pupils are still in the Stone Age in that particular part of their seeing apparatus. But, drawing is in itself a training for definite seeing and definite thinking.

Individual power develops by self-expression. In most schools the impression side is stronger than the expression side. Children, poor things, are much like the geese of France which are corraled and stuffed so as to produce those abnormaly large livers used in making pate de foi gras. Ideas are poured into the children in much the same way. Their salvation comes in self-expression, one of the most productive means of original power. There should be a chance for pictorial story-telling. Little children gaily enter into this phase of self-expression, but as they grow older, this spontaneity is often lost, and then it is hard to bring freedom into the work again. Composition is the same, whether in literature, music or art, or in the achievement of the arrangement and decoration of a room. There should be a clear and definite idea or theme. One system of musical education, which has proven itself a successful method, begins immediately with the making of musical pictures, little themes composed and developed by the child and are his own expression of an idea and which he plays in major or minor key as the mood changes from gay to sad. This is carried on through his musical education with the result that there is a spontaneity in his playing, a breadth of feeling and a greater appreciation of the master's mood. This is true, too, of composition in art. Every line shows some kind of action. There should be developed the feeling for the quietness, the stability, the restfulness of the horizontal line; the soaring quality, the uplift, the aspiration of the vertical line; the restlessness and sweeping force of the oblique line, and the grace and beauty of the curved line. Whatever the outcome for the student, his appreciation and interest is aroused. There is great difficulty in getting full and free expression, in the short period of the drawing hour, for, as the work is done by hand, and it takes some time to express the thought, the end of the hour finds the work unfinished, with the idea not developed far enough to carry it to a successful completion. Instead of short periods through the week, possibly a combining of the time into two longer periods would bring better results. Self-expression is the greatest achievement and should come first in art, for we remember only what we use, and no knowledge is worth having unless we can make it into our own fiber. Then, having something we wish to say, whether it be as a drawing, as a design, as a piece of pottery, or whatever it may be, the desire for a fine way in which to say it will be developed—the means to the end.

In conclusion, I should like to quote Professor Hooper of Brooklyn Institute in his Ideals of Education. "The three R's are but a preparation for further study. One-third of the school time is wasted in educational fads, and only recently have the true progressive ideas of manual training and industrial education begun to receive the attention which their importance demands as preparatory to an independent future. For the three R's I would substitute the three I's.—Industry—teaching the boy or girl to love work and you have laid the foundation for the building of character, for the encouragement of independence, for the development of will and the power of appliation. Integrity—strict honesty to ourselves and to one another as a fundamental precept of life and character building. And third, Idealism—the ideals to be developed by the study of history, of the Scriptures, of the prophets and sages of all time."

And this from Ruskin:

"Education without Industry is Guilt
Industry without Art is Brutal."

MANUAL TRAINING CONFERENCE

MECHANICAL DRAWING.

MR. FREDERICK R. STILL, DETROIT, MICHIGAN.

From the business man's point of view, the average mechanical draftsman is about the most inefficient workman among all his skilled employes, and he is generally looked upon as "a necessary evil." This is not because the employer has no appreciation for a good, highly intelligent, conscientious and painstaking draftsman, neither is it due to failure to appreciate what a good draftsman can add to or a poor one deduct from the economical production of a manufacturing plant, but it is principally due to an almost universal lack on the part of most draftsmen of a thorough knowledge of modern machine shop practice. In other words, the rank and file of mechanical draftsmen, who are available nowadays, are not properly equipped, either by education or machine shop experience, to make drawings which will show everything so complete that the pattern maker, foundryman, order clerk or machinist can proceed without having to refer again and again to the drafting room for more definite information, which should have been on the drawings in the first place.

None but the old and experienced draftsmen, when designing a new part or a complete machine, give very serious consideration to the available tools or equipment in the shop, or to the best available standard sizes of the

raw stock. Few of them consider how the parts will have to be machined, or finally assembled; it is an invariable practice to omit limits and tolerances somewhere on the drawings, and very absurd things are done, every day, in the proportioning of parts for strength, wear and appearance. Yet all these are things of prime importance to every manufacturer, as time uselessly wasted is money lost, and every dollar saved in material or equipment, is a dollar earned, placing the manufacturer that much nearer to the goal of "Profit."

A draftsman may be ever so intelligent; he may be the most conscientious individual in the world, be very painstaking, neat and rapid in his work, yet without a thorough knowledge of the practical things he has to deal with in his chosen profession, he may be an utter failure from a machinist's standpoint, regardless of how much he may be admired for his many other virtues. It may be well to say here, however, that when such a man is found, he is seldom allowed to get away as there are altogether too few of him. He is usually taken in hand by the head draftsman, or somebody else, and given the necessary training to make a good draftsman out of him. This takes time and patience and costs the manufacturer a lot of money, not alone because of the time required to instruct him, but because of his costly errors of judgment, oversights, omissions, etc. But when such a man has put in some years under proper direction, he becomes a prize to any manufacturer, and many are the instances where such men have been advanced to positions of the highest responsibility, and have made a great success of their business careers.

It should not be incumbent upon manufacturers to have to maintain schools for practical instruction. No business man expects a cub draftsman, just out of school or college, to have the experienced judgment of the veteran. Neither is he expected to immediately adapt himself to the system in vogue in that particular office. But he is expected to have a good education in mathematics, know how to determine the strength of materials under stress; have a good working knowledge of all branches of applied mechanics, and to know quite as much about foundry and machine shop practice and the adaptability of machine tools as the man who has to do the work from his drawings.

The province of our manual training schools and colleges is now and properly should be to give young men a good theoretical education, but the experience given them, in the way to apply such theories to the gaining of practical results, is altogether too limited; they do not get enough instruction in practical constructive work. They are given only a most superficial knowledge of it; yet in some way, they graduate with the idea that they are capable of filling most any position as draftsmen, and upon being hired are frequently expected to know how to go about carrying out on paper in full and complete detail, the most intricate ideas, that may involve the utmost nicety of judgment, as well as knowledge of the use and limitations of

almost every tool in every department of the institution. The result is obviously detrimental to the general opinion of draftsmen and is very disappointing and discouraging to the young men.

One of the most prolific sources of inefficiency in the machine shop originates in the drawings. In some shops the drafting room dominates the shop; in others the reverse is the case.

The drawing should be essentially an empirical order showing *what* to make and *how to* make it; it should also be an accurate record of what *has been* made. These being the proper functions of drawings, then it follows that the drafting room should dominate the shop. It then becomes quite safe to assume that wherever it does not, it is because the management has more confidence in the ability of the mechanics in the shop than in the draftsmen in the office, and is willing to assume the added expense incurred. This is not the right order of things from any standpoint in a properly organized institution.

If the shop dominates the drawing office, productive efficiency must be reduced owing to the time required to lay out or figure out various details. Further, the office can never have a truly correct record of what was previously made, should a duplicate be required later.

Technical schools are apparently inclined to teach drawing today just the same as they did years ago, when machinists were men with mechanical intelligence. Such is not the case today. Most of the so-called machinists of this age are not mechanics, they are machine operators. Modern systems have made it possible to pay such men better wages than the old-time mechanic received.

If it were not for the system, the majority of the present so-called machinists would be on the "bread line" instead of earning the wages they do.

Drawings must, therefore, be made so such men can understand them. Nothing can be left to their discretion, as they have none. This exacts more from the draftsmen, but it is an almost hopeless undertaking for the shop, if the drawings are not made perfectly clear, exact and complete in every respect. If they are not, then the foreman must act as interpreter, spending time that he could more profitably spend elsewhere.

By this it is not meant that draftsmen should be taught to understand that nothing of value can originate in the shop, as more improvements have originated there, and with proper encouragement will continue to do so, than in the drawing office. He must be taught to realize fully what is the purpose of his drawing; to make it so plain that anybody who can read drawings will understand it; to appreciate the necessity for views of the object from every side with ample sectional views, dimensions and finish wanted. All material should be clearly specified and the dimensions of the raw stock should be given. He should be taught to avoid the usual cobweb of dotted lines, always confusing, and the meaning of which the draftsman himself sometimes cannot explain a few months later.

Very seldom is the average draftsman who is hired at random, able to tell the proper finishing limits for anything, even so simple as a plain set collar; many so-called draftsmen do not know how to properly apply the dimensions to it. For example: One case recently came under observation, wherein a set-collar was required. It was marked 3 inches diameter over all and the thickness of the metal between the hole and the perimeter on one side was given as 19/32″ instead of giving the diameter of the hole as 1-13/16″ with finishing limits to fit the shaft.

The error in dimensioning this set collar required the time of somebody to figure the size of the hole to bore the coupling. Besdes, the reamer available was found to be a thousandth under size and the job did not look like one for which it would pay to buy a new reamer. So the foreman had to go to the drawing office to find out what it was for and learned that another department was making the shaft, so he had to chase back to see the foreman of that department to learn if he had turned the shaft yet; if he had not, then they would get together and agree on the size to finish it; if the shaft was finished, then something else would have to be done. All this and more could have been saved if the drawing had been right and complete in the first place.

Again, if the draftsman had understood shop requirements, he would have specified the collar to be made out of cold rolled steel, whereas in the routine of things a pattern was made, it was cast in the foundry, cleaned, handled innumerable times and had to be machined all over, at a cost of many times what it could have been made for, with proper judgment used by the draftsman who theoretically made it on paper before the real object was made in the shop.

This is but an example of about the simplest thing that might go through a plant, yet see what confusion and waste resulted from sheer lack of ability or foresight on the part of the draftsman.

To carry this further, supposing the draftsman had specified the set-collar was to be made of cold-rolled steel, had dimensioned it properly and given "limits and tolerances," but failed to keep himself informed or made no inquiry as to dimensions of bars in stock. His drawing calls for 3″ outside diameter, but the only available stock is 2-3/4″ and 3-1/2″ diameter. Hence the foreman, not knowing what particular function this collar may have to perform, has to go to the drawing office to get this information, where he learns that it has the entire universe for its surroundings and simply has to keep the shaft from sliding out of a bearing axially. In other words, he can use the 2-3/4″ stock.

In this example are given five common every-day omissions, one or more of which a very large majority of draftsmen fail to properly recognize:

1. The drawing was incorrectly dimensioned.
2. Failure to mark dimension limits and tolerances.
3. Failure to specify the material to use.

4. Failure to learn of available stock sizes.
5. Failure to know tools available.

There is a vast difference between a designer and a draftsman. The former is frequently the poorest of draftsmen, when it comes down to actually making drawings. His work is of a broader scope as a rule, and the draftsman is usually expected to begin where he leaves off. If the designer overlooked an oil hole, it is the draftsman who should provide it. There should be no conflict of ideas; one should lean on the other, but the latter should strive to carry out the designer's ideas, in such a manner as to make a workable machine, with the least possible investment for new equipment, built as far as possible from standard material regularly carried in stock and put together in a manner best suited to the shop and its equipment, so that it will cost as little as possible, consistent with the results desired.

All this requires better knowledge of machine shop practice than the average draftsman possesses, which he can only acquire by actually spending some time in the shop as a machinist, or many years under the direction of a capable head draftsman.

This leads up to a point where the instructors in technical schools can do a great deal of good toward changing the ideas of young men under their instruction, while the latter are of the impressionable age. Observation leads one to the conclusion that the idea gained by most young men graduated from technical schools, is that because of their education they belong to a superior set and that to work as a machinist is beneath their station in life; that it is somehow degrading.

They fail to comprehend the tremendous mastery they have over their less fortunate shop mates because of the education they have obtained, and that a year or two in the shop is but the rounding out of their education to complete what was left undone in their theoretical training.

Everyone of us can recall any number of people who served their time in a machine shop and who now hold positions of the highest responsibilty with some of the largest concerns in the country. The time is fast approaching when men of such experience will be the only ones who will draw a salary worthy of mention in the big offices; all the others will be relegated to the class now dubbed as tracers. Preference will always be given to technical graduates when hiring machinists and their advancement is always rapid if they have initiative and ability.

There are one or two other things which suggest themselves: Either completely eliminate conventionalities, legendary signs and abbreviations as apart of the instruction course for draftsmen or else all educational institutions should arrive at a universal agreement as to what such things stand for.

The ultimate successful use of them for shop work is doubtful however, even if such an agreement is reached, as the present day mechanic has, if anything, only the most rudimentary education, and more likely than not,

has difficulty in understanding even plain English, much less abbreviations and signs. As time goes on and the number of foreigners increase, this condition will not only continue but will become more pronounced.

Another thing to teach the young man is to be systematic about his work, the care of his books, tools, notes, lettering, dimensioning, titles to drawings, filing, etc. A tremendous amount of energy and time is wasted for want of a full appreciation of the advantage of a systematic way of doing things. It is unnecessary to tie everything up in "red tape" to do this, as the latter is quite as bad in the ultimate result as carelessness, but whatever is done should be done with the ultimate object in view and should be done in such a manner that it can be done the same way a second or third time, and when it has to be referred to again, it is definitely fixed in the mind as to how it was done, how it was arranged, where to look for it and what it should reveal.

The real difference between system and "red tape," is that with a system you know how to get at a thing yourself or can tell somebody else how to get it for you or for himself; on the other hand, "red tape" means you cannot get it yourself, neither can you tell anyone how to get it, as you are dependent upon one or more other people forming a link to complete the chain leading to the objective.

This may all look as though, from the viewpoint of the man who has to employ draftsmen, all the technical educational institutions were a complete failure.

If such an impression has been conveyed, it is time to make a hasty apology and to say that such is far from being the case.

The technical and manual training schools are doing a grand, good work, which every employer of mechanics appreciates, and only wishes they could turn out more students to fill the places always ready to receive them.

The mental training young men receive in such schools makes them very desirable employes, regardless of their ability to do things, as they are quicker to learn new ways and methods, have a better comprehension of the scope of any suggestions made them and generally exhibit a deeper interest in the work they have to do, because their mental training opens up to their minds greater possibilities than the untrained mind can see, as the latter seldom sees much below the surface.

What is now wanted in addition to the training the students already receive—in order to make them more quickly valuable to their employer—and incidentally to themselves—is to modernize the methods of their instruction, so as to get abreast of modern manufacturing methods on the highly intensified scale of production which is now carried on in every large and successful institution.

Sociologists are in a quandary as to what the present shop methods will eventually lead to. Future history will have to tell us that story. In the meantime we are confronted with a situation which must be met by the practical application of such remedies as are available. The remedy to apply

to the production of better draftsmen is to make them superior mechanics or machinists. Broaden the scope of their training in present machine shop practice. Teach them more about what they should know than what they should do; then teach them what to do to acquire what they should know.

There is a general feeling abroad among manufacturers, that the instructors in our technical and manual training schools are chosen more for their mental training in mathematics and theories than for their practical training in modern shop methods.

There certainly is in some cases good ground for such a conclusion too. It is not fair to the young man to place this handicap upon him and it is not fair to the institution where he gets his education.

It is to be hoped the day will soon arrive when the Boards or Commissioners who control such institutions, will appreciate the advantage to all concerned, by providing funds which will enable instructors to spend at least one year out of three in the study of shop requirements in various fields of industry, enabling them to work in the shops, thus getting into immediate touch with the actual conditions.

Every manufacturer would welcome these men for the suggestions and criticism they could make, by comparison with methods in vogue in other shops. It would brighten the wits of everybody and be of immense value to the student. It would also have a fine effect on the regular employes of all the institutions where the instructors worked. It would spread a different propaganda throughout the manufacturing world, than the mistrust, distrust and unrest so commonly prevailing in the shops today. The good effect to be obtained by such a course is immeasurable from every viewpoint and is beyond question the key-note to the solution of many of the most vexatious problems confronting manufacturers today. It is a question altogether too broad and far-reaching to more than suggest here, and is only mentioned as the very foundation to a permanent advance in the methods of instructing young men to be better draftsmen.

WHAT SHOULD MECHANICAL DRAWING ACCOMPLISH IN THE TECHNICAL HIGH SCHOOL?

MR. FRANK R. KEPLER, DETROIT.

A mechanical drawing course in a technical high school must meet three requirements: train for the industries including the trades and drafting room; train for immediate use in the school shop; and train for the engineering school.

In accordance with modern methods of manufacture, the workman is required to work to the drawing. It is essential that he shall understand

the position of the different views, the standard concentions, finish, limits, notes, reference numbers, bill of material. The time was when the factory superintendents and foremen were the only ones having this understanding. Under present managemet the more humble hand, those who set up the machines, tool room boys, inspectors, assemblers must be able to work to or read working drawings. Not only the hands and eyes of the man are demanded but the brain as well.

All trades,—electrical workers, sheet metal workers, builders, pattern makers,—require a knowledge of working drawings and plans. Such knowledge is necessary to enable one to make up estimates of costs and materials.

A student training for any industry should be able to make out his bill of stock, plan out the method of completing the project, and order the tools required.

A course in mechanical drawing should aim to give a student a knowledge of drafting room practices, a familiarity with some of the more common forms of mechanism, and a feeling of independence. Through the work in the drafting room of the school a good working knowledge of instruments, materials and processes should be gained. A good plain system of lettering should be acquired, to be done skillfully. The boy ought to become familiar with tracing paper and cloth, how to make a neat, well executed tracing, good clean lines and curves. As in all well regulated drafting rooms, a definite system of sizes, numbering, indexing and filing should be practiced.

A student coming from a technical high school must be able to select and place the views of a piece in the proper position and not make the common error of placing the left hand view at the right of the front view. This he should be able to do quickly, free hand, if necessary. He should know what a section view is and how to make one. The boy ought to make an intelligent use of dimensions, finish marks, special finishes limits. Much of this knowledge is gained in the various shops of the school and simply carried over to the drafting room. The well equipped student will have gained at least an elementary knowledge of the screw thread and other applications of the helix as well as of levers, cams, and different forms of gears. The terms used in connection with these forms of mechanism should be familiar to him.

The prospective draftsman must acquire some definite order of procedure if he would gain success and not waste the time of his employer. The student himself will see where many false movements and unnecessary processes may be eliminated. He should learn to check up as the drawing proceeds. He should early learn to work from center lines and finished surfaces. Sketches, specifications, formula should be used liberally in the school drafting room to teach their use. Working from sketches and specifications has great value. Although the working out of a formula belongs to math-

ematics, its practical application can be shown to great advantage through empirical design.

Practice should be given in assembly drawing from details and detail drawing from assembly drawing. This ensures an ability to read and correctly interpret a working drawing. The use of tables and hand books can always be urged upon the student. To become familiar with such hand books as Kent's Mechanical Engineers' Pocket Book, Machinery's Hand Book, American Machinists' Hand Book, Cambria Steel Book, and even I. C. S. Mechanics' Pocket Books is a valuable asset.

A boy who can work from sketches and specifications, use formulas, and make an intelligent use of hand books has a great commercial advantage. The training a technical high school student receives should teach him how to "take hold of a job" and accomplish something in a reasonable length of time, he ought to be able to follow directions, acquire the standards and fall into the system of any concern far sooner than he could otherwise hope to do. His advancement should be more rapid. Too much emphasis cannot be put upon the training in ability to "take hold" of a piece of work, to use the head. This is one of the most important phases of the training for the drafting room or industries.

Since in a well regulated school shop the work is carried on largely through the use of blue prints as in a regular shop, the student is required to interpret and work to a drawing. First the student must grasp the idea of the project, make out his bill of stock, and then work to dimensions. It is essential then and a part of the drafting room work to see that the student is able to read a working drawing as soon as possible in his course. After many attempts to teach the reading of drawings, experience has proven that to make actual working drawings at the start, is the best, if not the shortest method. In other words, we make working drawings to teach the reading of such. The drawings are not necessarily of some project that the class or the individual is making or is to make in the shop. In fact, we feel that there is more value to the student in reading a drawing that someone else has made. Certainly, a fellow will be more thoughtful in making a drawing perfectly clear if he knows that he is making it for some one else to read. This is the actual practice in the industrial world and can well be followed in the technical high school. Placing of views, delineation, dimensioning, putting on of notes, finish, can be taught in drawing a jack screw just as effectively as in making a drawing of some project the student himself is to work on. It is not so much the thing drawn as the content, the principles involved. The practice is the thing required.

Where manual training and mechanical drawing are taught for their cultural value it is a very nice theory to have the student design his project, make the working drawing including tracing and blue printing, and finally build and complete the piece. The sequence of operations is not destroyed however by the students making drawings for the shops to be used by oth-

ers than themselves. They cannot make the excuse that they would know how to make this part or that, the size here or there. An attempt should be made to approach the conditions in actual practice as closely as consistent with good teaching.

With all this training some degree of skill must be acquired. After four years of academic training for an hour each day, a boy should be able to letter well, make a clean cut, neat tracing, well arranged drawing and notes. An appreciation of the fact that a job is not done, until it is done right should be instilled. Both men and boys really appreciate being held to first class, finished work. Of course, we will always have the loafers with us.

Comparatively a small proportion of the students who enter the technical high school continue in an engineering school. It is the duty then to provide for the needs of the greater number. A great many through force of circumstances are obliged to leave school at the end of a year or two. In that time they should have acquired the ability to work to a drawing, make a correct drawing of a fairly difficult piece, and do a little free hand sketching to assist in interpreting a working drawing or more clearly express his own ideas. The design and free hand drawing will help to temper the lines of a project and aid the student in getting away from that rigid dependence on mechanical means.

For the student who expects to enter an engineering school, a year of mechanical drawing and a year of applied design including free hand perspective, from objects and working drawings, and pure design should meet all requirements. Those may be supplemented by a study of prejection to explain the reason for the placing of views, making sections, intersections and layouts. If orthographic projection is to be attempted as such, let it be done in a manner so as to give a correct knowledge of the principles as far as one attempts to carry the subject. We do not believe this can be done by means of copying drawings nor very successfully until the student has gained some knowledge of geometry..

It is not the desire to encroach upon the legitimate field of the engineering school. We fully appreciate the feeling that the engineering school desies to teach descriptive geometry in accordance with its own aims and methods. Unless the teaching of the principles of orthographic prejection and their application cannot be done intelligently it may better be left undone and I am sure we would have the thanks of the instrutcors in our engineering school.

The greatest value derived from a course in mechanical drawing in a high school by a prospective engineering student is to give him the power to more readily adjust himself to his engineering work, especially his drawing. His ability to use the instruments intelligently in itself gives him an advantage over students who have not had this training. The time that he saves in becoming adjusted can be spent on other subjects. Here again it is not so much in the knowledge stored away for use as in the power to take hold to some purpose. He feels that some things are familiar friends at least.

Any more advanced work such as design, detailing, and mechanism will be allowed toward graduation in our university provided the drawings are submitted for approval.

In conclusion, we will say that it is not so much the purpose of mechanical drafting in the technical high school to give just so much definite knowledge stored away, to be brought out when occasion demands in the shop, drafting room, or engineering school, but to give an organized whole, a close interrelationship between his shop, mathematics and drawing, also practice work in order to gain a certain degree of skill. This will allow him to work to advantage, adjust himself more readily to local conditions, to take hold of the job. We do not believe that a graduate of a technical high school should expect a better job to begin with than the other fellow who has not had the advantage of his training. He should be willing to show what he can do, to produce the goods,, and his employer should see that he is advanced accordingly and as rapidly as is consistent. The great disadvantage of the average high school graduate is that he is not willing to be shown and not willing to show what he can do.

THE JUNIOR HIGH SCHOOL AND MECHANICAL DRAWING.

PRINCIPAL PAUL C. STETSON, GRAND RAPIDS.

When your chairman sent me your program I noticed at once that all the speakers excepting myself were men who either were actively engaged in teaching mechanical subjects or had a technical preparation which presupposes a thorough course in that subject. Unfortunately, I cannot claim either advantage so that what I may have to say on the general question of mechanical drawing will be from the view point of an administrator and not that of one who has an intimate first hand knowledge of the subject. What I want to make clear at the start is that I will not and indeed, could not outline any comprehensive workable program for a course in mechanical drawing in the Junior High School. All that I can hope to do is to outline how the subject should be approached from the point of view of the needs of the Junior High School as we have found them.

Inasmuch as the Junior High School is of rather recent origin a word of definition may not be out of place. The Junior High School is the grouping together under the departmental system of the seventh, eighth and ninth grades. This may be accomplished as at present by placing the pupils in a separate building or by having a six-and-six plan or through any other plan which secured the same end, namely, the segregation of pupils of that age and grade. Under any system of organization however, there will be some differentiation of subject matter, increasing in amount each year, until in

the ninth grade, we find a pretty complete departure from the traditional plan of the ordinary grades. However, with this increased differentiation, there will always remain certain subjects which all of the students in the first two years of the Junior High School must take, unless especially excused; namely, arithmetic, English, history, and manual training, the last named term being used in its broadest sense to include all forms of manual activity carried on by both boys and girls.

With this fact in mind, then, that all the boys of the first two years will take manual training, our problem becomes different from that encountered in the senior high school where presumably those students who are taking shop work are doing so with a specific purpose. Shop work in the Junior High School divides itself rather sharply into two divisions—first, that which is given to the small group who will not continue in school beyond the legal requirement and who will enter some occupation at once upon leaving school. With many of these boys, the problem is a definite one of trade training and there is no rooom in the limited time given for them to take an extensive technical course in mechanical drawing. The second division of the work must be given to that larger group who are taking the work because it is required, who presumably will continue but who may or may not take up technical work upon entering high school. In either case, the shop work, and in this term I include mechanical drawing, is of a prevocational nature only and is not strictly trade training. Therefore it seems that the function of mechanical drawing is with us, not to give technic in the subject but is, first, to give the boy such knowledge of the subject as he will need to meet the immediate requirements of the work he is performing at any given time, and second, to give him that insight into the subject which will enable him to determine when making a selection of senior high school courses whether he has the aptitude to carry it on.

Perhaps a brief statement of the way in which the work is carried on in Grand Rapids may be interesting as illustrating what has been said. When the boys reach us from the grades, they have had some mechanical drawing. That is, they are familiar with the T-square and the triangle. In their grade work, they have made simple drawings for their knife work. After they come to us, they must learn to use the scales, the ruling pen, the compass, both pen and pencil and the dividers. With us, they must be able to make a working drawing, to read a simple working drawing and to represent by a working drawing what they wish to make. We regard the latter as essentially a part of their constructive work. One of the first bench problems is to make a key rack; before they have finished they may have to make an eight sided taboret or a porch swing or a Morris chair. But all the way through, it is necessary that they should first represent the object to be made by a working drawing before a tool is touched toward the actual making of the object. In addition, they must be able to read a simple drawing. This, of course, implies some work in mechanical drawing. This they

get in the way I have indicated, namely, in connection with their everyday work.

Personally, we do not believe, in our school at least, that it is necessary or even desirable to set aside an extra hour which shall be devoted to mechanical drawing. For such formal instruction must be given by means of exercises which are not real in the shop, and it also must aim at developing a technic which we feel is not an essential. What we feel ought to be accomplished by mechanical drawing in the Junior High School is to give the boy the abilty first, to make an accurate working drawing of that which he desires to make, and second, to enable him to read a simple drawing. With us his technic is secondary, but his ability to actually produce results, primary.

Mechanical drawing with us is a means to an end, and not an end in itself. We dq not believe that mechanical drawing can profitably be introduced into the Junior High School with the thought of teaching draughtsmanship. Before we begin to make draughtsmen, we must be sure that the boys taking it are fitted for it and that they are old enough to grasp the technic of it. Junior High School boys are not old enough to be sure of their aptitudes nor to do the finer work. This is better left to the eleventh and twelfth grades of the senior school.

It has been stated that with us mechanical drawing is a means to an end. That end, as we conceive it, is two-fold—to give that general information about the subject which will prove a sound background upon which he may later base his selections in the senior school, and to provide him the necessary equipment with which to perform properly the required shop work of the course.

Roughly speaking, in our school as in every other school of like character, our boys may be divided into three classes: those who will do the regular work and who will enter the senior school upon leaving us; those who could continue but through the pressure of economic forces or through indifference, stop when the legal requirements have been met, and those who have no aptitude for and indeed should not enter the senior school but who must get their preparation for later life in the Junior High School or Trade School. For those who desire to follow commercial lines, such as bookkeeping, or stenography, we have provided. Likewise for those who want to be printers. But that is a narrow field and there are left many boys who could not qualify for either bookkeepers or printers through natural aptitudes or through desire. For a city without a trade school or a continuation scheme, the question naturally comes up to the Junior High School as the logical place for its solution.

This being the case, the question arises—What about mechanical drawing for these boys? In Grand Rapids, out of a school of more than nine hundred pupils, we find many of the type just mentioned and yet the manual trainng men tell me they have not found one who was qualified to be trained

for a draughtsman. This being the case, we are quite firmly committed to the plan of making that part of the training secondary, that is, we emphasize mechanical drawing only as it throws light upon the problem to be worked out, whether it be a problem in cabinet making, metal working or sheet-metal.

In closing, I want to make clear that we do not regard mechanical drawing in the Junior High School as "secondary" in importance but only in its relation to the problem in hand. We feel that it should form a very important part of the boys' shop education as is shown by the fact that every bit of construction must be preceded by a working drawing. However, we do not advocate its being taught as a separate subject and thus being isolated from the actual shop work.

SYNOPSIS OF BUSINESS MEETING

April 2, 1915.

The meeting was called to order by President D. B. Waldo. The minutes of the last annual meeting were read by the Secretary and approved. Report of the Secretary-Treasurer and auditing committee were made and accepted. The report of the nominating committee was made by Superintendent A. N. Cady of Flint, adopted, and the officers therein named were declared elected.

The report of the committee on resolutions was read by Superintendent S. O. Hartwell of Kalamazoo, and adopted.

Superintendent E. E. Gallup of Monroe moved that the club authorize the creation of a new Conference of the club to be known as the "Domestic Science and Art Conference." The motion prevailed.

President Waldo made a few remarks chiefly upon the bill before the Michigan Legislature concerning a Retirement Salary Fund.

Nominating Committee.

Chairman—A. N. Cody, Flint.
At Large—C. O. Davis, University.
L. P. Jocelyn, Ann Arbor.
Classical Conference—F. O. Bates, Detroit Central.
Modern Language Conference—Matilda Schroeder, Bay City, W. S.
English Conference—Ida M. Schaible, Adrian.
History Conference—Joanna K. Hempsted, Detroit Western.
Physics and Chemistry Conference—C. W. Greene, Albion College.
Mathematical Conference—J. W. Bradshaw, University.
Biology Conference—A. D. Magers, Northern Normal.
Commercial Conference—W. W. Warner, Saginaw, E. S.
Physiography Conference—F. W. Frostic, St. Charles.
Art Conference—Bertha Goodison, State Normal College.
Manual Training Conference—J. M. Frost, Muskegon.
Education Psychology Conference—J. B. Davis, Grand Rapids.

Committee on Resolutions.

S. O. Hartwell, Kalamazoo; C. E. Chadsey, Detroit; I. N. Demmon, University; E. E. Gallup, Monroe; C. E. Barr, Albion College; J. C. Hoekje, Grand Haven.

Auditing Committee.

Prinipal H. R. Atkinson, Battle Creek; Professor A. G. Hall, University.

FINANCIAL REPORT OF THE SECRETARY-TREASURER, 1914-15

Receipts

1914.		
March 7	Balance as per last report, Commercial Det	$ 33.60
March 7	Balance as per last report, Savings Dept	24.09
March 14	Deposit advertisements	10.00
March 14	" sale of Alumnus	50.00
March 26	" " " "	70.00
March 26	" advertisements	10.00
March 28	" dues	93.20
April 2	" "	111.00
April 3	" "	351.00
April 4	" "	86.00
April 16	" book, dues, and advertisements	19.50
July 23	" back dues	18.00
Oct. 10	" " "	12.00
Nov. 11	" " "	5.00
1915		
March 15	" " "	1.00
March 22	" " "	1.00
Total		$895.39

Disbursements

1914.			
March 16	Check No. 283	H. W. Haller, stamps	$ 20.00
March 19	" " 284	H. W. Haller, stamps	3.00
March 26	" " 285	Mack and Co., stamps	2.00
April 1	" " 286	Prof. H. J. Davenport, address	38.00
April 3	" " 287	James Hughes, doorkeeper	.95
April 3	" " 288	Fowler Osborne, doorkeeper	1.60
April 3	" " 289	Paul Van, Arman, doorkeeper	1.50
April 4	" " 290	L. P. Jocelyn, salary to April 1, 1914	200.00
April 6	" " 291	Western Union, telegrams	2.61
April 8	" " 292	E. Rehm, janitor service	1.00
April 8	" " 293	Nellie Easton, clerk	5.20
April 8	" " 294	Bessie Gordon, clerk	3.00
April 8	" " 295	S. W. Millard, badges and printing	12.00
April 9	" " 296	M. F. Longworthy, doorkeeper	1.30
April 15	" " 297	Cecil Andrews, doorkeeper	2.70
April 15	" " 298	Elmer Burns, doorkeeper	1.05
April 15	" " 299	Walter Bruer, doorkeeper	.80
April 15	" " 300	H. J. McNiel, doorkeeper	1.00
April 15	" " 301	E. M. Apple, doorkeeper	1.20
April 17	" " 302	N. S. Huntington, doorkeeper	1.00
April 18	" " 303	Oscor Thiel, doorkeeper	1.60
April 22	" " 304	S. S. Hawkes, doorkeeper	1.20
April 22	" " 305	Aaron Lief, doorkeeper	.60
April 22	" " 306	Edith Shaw, Eng. Conference	3.53
April 24	" " 307	R. E. Spokes, doorkeeper	1.10
May 16	" " 308	Haller Jewelry, stamps	5.00
May 19	" " 309	F. L. D. Goodrich, book	1.50
Sept. 22	" " 310	Clerical work and office expense for to Apr. 1, 1914	47.65
Sept. 28	" " 311	Haller Jewelry Co., stamps	2.00
Oct. 1	" " 312	L. P. Jocelyn, salary April 1—Oct. 1, 1914	100.00
1915			
Jan. 20	" " 313	Haller & Co., stamps	2.00
Feb. 20	" " 314	University of Michigan, moving stereopticon	2.15
March 18	" " 315	Haller and Co., stamps for programs	20.00

March 19	"	"	316	Haller and Co., stamps for programs	10.00
March 22	"	"	317	H. J. Abbott, P. M., stamps for proceedings	20.00
March 24	"	"	318	Ann Arbor Press, year's printing 1914 meeting	284.36
March 26	"	"	319	American Express Co., delivery proceedings	1.86

Total disbursements	$ 804.46
Total receipts	895.39
Balance March 26, 1915	$ 90.93
Balance in Savings Dept	24.09
Balance in Commercial Dept	$ 66.84
One check returned	1.00
Balance March 26, 1915	$ 65.84

Report of Auditing Committee.

We, the undersigned, have examined the accounts and vouchers of the Treasurer of the Michigan Schoolmasters' Club and find the same to be correct and accurate.

H. R. Atkinson.
Arthur G. Hall.

Report of Nominating Committee.

Officers for the year 1915-1916.

President—J. W. Mauck, Hillsdale College.

Vice-President—Mary E. S. Gold, Flint.

Secretary-Treasurer—L. P. Jocelyn, Ann Arbor.

Classical Conference—Chairman, F. W. Kelsey, University; Vice-Chairman, Marian L. Jennings; Secretary, Clara J. Allison, Owosso; Member of the Executive Committee, F. O. Bates, Detroit Central.

Modern Language Conference—Secretary, Emilie A. Flintermann, Detroit Central.

English Conference—Chairman, T. E. Rankin, University; Secretary, Ida M. Schaible, Adrian.

History Conference—Chairman, Mildred Hinsdale, Grand Rapids; Secretary, Bessie L. Priddy, Adrian.

Physics and Chemistry Conference—Chairman, F. R. Gorton, State Normal College; Vice-Chairman, Theodore T. Wagner, Detroit; Secretary-Treasurer, F. C. Irwin, Detroit.

Mathematical Conference—Chairman, L. C. Karpinski, University; Secretary, E. F. Gee, Detroit.

Biological Conference—Chairman, James R. Locke, Highland Park; Secretary, Helen B. King, Saginaw.

Commercial Conference—Chairman, L. H. Rich, Bay City; Secretary, O. V. Adams, Ann Arbor.

Physiography Conference—Chairman, Helen Martin, Battle Creek; Secretary, W. LeRoy Perkins, Dowagiac.

Art Conference—

Manual Training Conference—Chairman, Paul C. Stetson, Grand Rapids; Secretary, to be appointed by the chairman.

Educational Psychology—

Principals' Association—

Report of Committee on Resolutions.

I.

Resolved, That the Michigan Schoolmasters' Club heartily approves the experimental arrangement of the present week in co-ordinating the "Short Term State Institute for Superintendents and Principals' with the Schoolmasters' Club, and urges the department of Education of the University and the State department to make this arrangement a permanent enterprise.

II.

Resolved, That the Michigan Schoolmasters' Club strongly endorse the bill now pending before the legislature providing for an appropriation for the safe and adequate accommodation of the library of the University of Michigan and for a building for a model school for the department of Education, and urges its favorable consideration.

III.

Resolved, That the Michigan Scholmasters' Club approves the principles and provisions of the Teachers' Retirement Salary Bill now before the legislature and strongly urges its adoption.

IV.

Resolved, That this Club express its appreciation of the effective work of the President, and of the assistance of the other officers of the Club and of the various sections in arranging so valuable and interesting a program for this meeting; and that we also thank the President and Faculty of the University for the courteous hospitality steadily given to the Club.

Respectfully submitted,

During the year four well-known members of the Schoolmasters' Club have passed away. The Club, in reverent memory, places on its records these tributes by friends and fellow-workers to

Professor Richard Hudson, Mr. Charles Francis Adams, Mr. A. E. Curtis, Professor F. C. Demarest.

C. E. Chadsey,
E. E. Gallup,
John C. Hoekje,
S. O. Hartwell.

In Memoriam

MR. CHARLES FRANCIS ADAMS

Mr. Charles Francis Adams was born in Wyoming County, New York, in 1854. He was graduated from Amherst College in 1877. Following this he spent one year in a law office in Detroit three years teaching in Flat Rock, two years in advanced work at the University and two years teaching at Orchard Lake. He taught for nearly thirty year in Detroit Central High School, leaving this work about three weeks before his death which occurred Oct. 29, 1914.

As a teacher in his specialty, physics, he was well known throughout the Central States. He was the author of a text-book of physics, and of a laboratory manual.

He was a member of the Schoolmasters' Club from its organization and was always active in its work, especially work of the Physics Conference.

In his death the cause of education in Michigan loses a strong, loyal and scholarly man. We cannot measure the influence for good of his gentle spirit and generous heart. Our lives are richer for having known him.

MR. A. E. CURTIS

The Grim Reaper has again entered our ranks and taken from our midst one of the choicest souls, Mr. A. E. Curtis. Mr. Curtis was educated in Union College and served the State of Michigan nearly forty years as a teacher, high school principal and superintendent. The early part of his educational service was given to the public schools of Saginaw. Over thirty years of his work was done in the public schools of Adrian. He was a man of rare culture and courtesy and was loved and respected by all who knew him. He went to his final reward from a ripe old age of plenty and happiness and from a large community of admiring and appreciative friends who feel that they are better because of their association with so choice a soul.

PROGRAM OF GENERAL SESSIONS

(Admission to all meetings of the Club by badge.)

Wednesday Afternoon, March 31

4:15 o'clock

BARBOUR GYMNASIUM

1. Young Ladies' Classes in Demonstration of Gymnastics.
2. Games.

HIGH SCHOOL PRINCIPALS' ASSOCIATION

Wednesday Evening, March 31

6:00 o'clock

MICHIGAN UNION

Chairman—Principal W. M. Aiken, Ann Arbor.
Secretary—Principal D. G. Clancy, Hillsdale.

1. Dinner.*
2. Address: The Present Status of the Doctrine of Formal Discipline,
   Professor E. L. Thorndyke, Columbia University.
3. Discussion: What is the High School Principal's Job?
   (a) Principal J. E. Porter, Cadillac.
   (b) Principal J. B. Gilbert, Grand Rapids Union School.
   (c) Superintendent C. E. Chadsey, Detroit.
4. Reports of District Principals' Meeting (10 minutes each),
   (a) Principal W. W. Warner, Saginaw.
   (b) Principal J. W. Sexton, Lansing.
   (c) Principal W. R. Atkinson, Battle Creek.

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* Open to all persons interested. Plates, at 75c, may be reserved by writing to W. F. Head, Ann Arbor High School.

Thursday Morning, April 1
9:00 o'clock
DEAN JORDAN'S RESIDENCE
Meeting of the Deans of Women of Michigan.

Thursday Morning, April 1
9:45 o'clock
HILL AUDITORIUM

President--President D. B. Waldo, Kalamazoo.
Secretary—Mr. L. P. Jocelyn, Ann Arbor.

1. Appointment of Committees.
2. The American City,*
   Professor Mark Jefferson, State Normal College.
3. Porto Rico,*
   Professor R. D. Salisbury, University of Chicago.
4. The Physiographic Features of Western Europe as a Factor in the War,*
   Professor D. W. Johnson, Columbia University.

Thursday Afternoon, April 1
4:15 o'clock
HILL AUDITORIUM
Musical Program,
Under the auspices of the University School of Music.

Thursday Afternoon, April 1
4:15 o'clock
ROOM B-8, HIGH SCHOOL
Michigan Interscholastic Athletic Association.

Chairman—Principal E. N. Worth, Kalamazoo.
Secretary—

1. General Discussion of Interscholastic Athletics.
2. Business meeting.

Thursday Evening, April 1
7:00-8:00 o'clock
THE MICHIGAN UNION BUILDING
Informal Reception of members of the Michigan Schoolmasters' Club and visiting Speakers.

Chairman of the Reception Committee—Professor W. W. Florer.

(Note:—The Michigan Union will be pleased to serve meals to a limited number of teachers during the meeting.)

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* Illustrated with the stereopticon.

Thursday Evening, April 1

8:00 o'clock

HILL AUDITORIUM

Chairman—Dean J. R. Effinger, University of Michigan.
Address: Great Italian Earthquakes,
Professor W. H. Hobbs, University of Michigan.

Friday Morning, April 2

9:30 o'clock

Business of General Session.

President—President D. B. Waldo, Kalamazoo.
Secretary—Mr. L. P. Jocelyn, Ann Arbor.

(a) Reports of Officers.
(b) Reports of Committees.
(c) General Business.
(d) Remarks and Recommendations by the President.

10:00 o'clock

Literary Meeting of General Session.

1. Some Present Day Educational Fallacies,
Professor Lotus Coffman, University of Illinois.
2. Subject to be announced later.
Professor Henry Suzzalo, Teachers College, Columbia University, New York.

Friday, April 2

12:00 o'clock

NEWBERRY HALL

Dinner and Conference of College Presidents.

Friday Afternoon, April 2

1:00 o'clock

ROOM B-2, HIGH SCHOOL

Michigan State Federation of Teachers' Clubs.

Chairman—Mrs. Lou I. Sigler, Grand Rapids.
Secretary—Miss Margaret Strahan, Grand Rapids.

General Business meeting of the Presidents.

Saturday Afternoon, April 3

12:30 and 3:00 o'clock

BARBOUR GYMNASIUM

Alumnæ Luncheon and Junior Girls' Play.

(Tickets should be reserved by Friday, April 2. Apply to Dean Jordan.)

PROGRAM OF CONFERENCES

CLASSICAL CONFERENCE

(Admission by badge)

All Sessions of the Classical Conference will be held in the Upper Lecture Room, Memorial Hall

Chairman—Professor J. G. Winter, University of Michigan.
Secretary—Anna S. Jones, Grand Rapids.

Wednesday Afternoon, March 31

2:00 o'clock

Presiding Officer—Professor Campbell Bonner, University of Michigan.

1. The Utilization of Commodian for the Study of Plautine Verse,
   Dr. Gilbert H. Taylor, University of Michigan.
2. Oxford's Estimate of the Classics,
   Professor Milton J. Hoffman, Hope College.
3. Why Professional Students Study Latin,
   Dr. Orma F. Butler, University of Michigan.
4. The Old Psalter in the Freer Collection,*
   Professor Henry A. Sanders, University of Michigan.

Thursday Afternoon, April 1

2:00 o'clock

5. A Teacher's First Year,
   Miss Helen K. Loman, Marshall High School.
6. Avant: A Review of Professor Bezard's Method of Teaching Latin,
   Miss Olive M. Sutherland, Northwestern High School, Detroit.
7. The Results of Recent Research in Greek History,
   Dr. Arthur E. Boak, University of Michigan.
8. The Morgan Manuscripts: The Beatus Commentary to the Apocalypse,
   The Rev. E. S. Buchanan, Oxford, England.
9. Some Ancient Illustrations of the Odyssey,*
   Professor John G. Winter, University of Michigan.

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* Illustrated with the stereopticon.

Thursday Evening, April 1
8:00 o'clock
HILL AUDITORIUM

Presiding Officer—Dean J. R. Effinger, University of Michigan.
10. Great Italian Earthquakes,*
Professor W. H. Hobbs, University of Michigan.

Friday Afternoon, April 2
2:00 o'clock

Presiding Officer—Professor B. L. D'Ooge, Michigan State Normal College.
11. Greek Ideas of an Afterward,
Professor O. O. Norris, Michigan State Normal College.
12. Latin Inside and Out,
Principal Edwin L. Miller, Northwestern High School, Detroit.
13. Discussion of Principal Miller's Paper,
Miss Clara J. Allison, Owosso High School.
14. The Purpose and Preparation of the Union High School Exhibit,
Miss Marion L. Jennings, Union High School, Grand Rapids.
15. Business meeting.
16. Latin as a Modern Language: An Exhibit in charge of
Miss Marion L. Jennings, Union High School, Grand Rapids.

MODERN LANGUAGE CONFERENCE

(Admission by badge)

Chairman—Dean J. R. Effinger, University of Michigan.
Secretary—Miss Emilie A. Flintermann, Detroit Central.

Thursday Afternoon, April 1
2:15 o'clock
ROOM 203, UNIVERSITY HALL

Chairman—Professor Arthur G. Canfield, University of Michigan.
1. The Education of a German Boy,
Professor Edward Elias, Hope College.
2. De Tocqueville's Visit to Michigan,
Professor Clyde R. Ford, State Normal College.
3. Lessing and Theology,
Professor John H. Muyskens, Calvin College.
4. Le Detroit,
Miss Lorley A. Ashleman, Detroit Central High School.

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* Illustrated with the stereopticon.

Friday Afternoon, April 2

2:15 o'clock

ROOM 203, UNIVERSITY HALL

Chairman—Professor Max Winkler, University of Michigan.

5. Romanticism and the Spanish Drama (1830-1845),
   Mr. Philip E. Bursley, University of Michigan.
6. The Future of the Modern Language Conference,
   Professor Arthur G. Canfield, University of Michigan.
7. Some Phases of the Feminist Movement in Germany,
   Miss Anna M. Barnard, Central State Normal College.
8. Wilhelm Hauff,
   Miss Alice Rothmann, Ann Arbor High School.
9. Paul Heyse,
   Professor J. A. C. Hildner, University of Michigan.

ENGLISH SECTION

(Admission by badge)

Friday Afternoon, April 2

HIGH SCHOOL AUDITORIUM

Chairman—William R. Stocking, Jr., Detroit Central High School

Secretary—Miss Edith Shaw, Eastern High School, Detroit.

1. The Teaching of English: Necessary Conditions of Successful Work,
   Principal Edwin L. Miller, Northwestern High School, Detroit.
2. General Discussion.
3. The Music of Literature,
   Professor Richard D. T. Hollister, University of Michigan.
4. The Greatest American Man of Letters,
   Professor T. E. Rankin, University of Michigan.

HISTORY CONFERENCE

(Admission by badge)

Thursday Afternoon, April 1

2:00 o'clock

ROOM C-3, HIGH SCHOOL

Chairman—Miss Mildred Hinsdale, Grand Rapids.

Secretary—Mrs. Bessie L. Priddy, Adrian.

1. The Committee of Five's Recommendation on Trial,
   Mr. L. A. Chase, Houghton.
2. The Place of Ancient History in the High School Curriculum,
   Miss Alice VanderVelde, Grand Rapids.

3. Report of a Committee on the Course in History for Small High Schools, appointed by the State Superintendent of Public Instruction,
   Mr. C. S. Larzelere, Central Normal.
4. Discussion,
   Professor Earle W. Dow, University of Michigan.

Friday Afternoon, April 2
2:00 o'clock
ROOM C-3, HIGH SCHOOL

5. High School Preparation for College History,
   Professor F. H. Foster, Olivet College.
6. The Influence of the United States on the Doctrine of Neutrality,
   Professor Jesse S. Reeves, University of Michigan.

CONFERENCE OF PHYSICS AND CHEMISTRY

(Admission by badge)

Thursday Afternoon, April 1
1:30 o'clock
PHYSICAL LABORATORY, WEST LECTURE ROOM

Chairman—Mr. D. L. Rich, University of Michigan.
Vice-Chairman—Mr. J. W. Matthews, Detroit Western.
Secretary—Mr. B. W. Peet, State Normal College.

Joint sessions of Science Conferences of the Michigan Schoolmasters' Club. (See program under Biological Conference.)

Friday Afternoon, April 2
2:00 o'clock
PHYSICAL LABORATORY, WEST LECTURE ROOM

Chairman—Mr. D. L. Rich, University of Michigan.
Vice-Chairman—Mr. J. W. Matthews, Western High School, Detroit.
Secretary—Professor B. W. Peet, Normal College, Ypsilanti.

1. The Westinghouse A. C. Restifier,
   Mr. Geo. W. Maxwell, Cass Technical High School, Detroit.
2. Chemistry for Girls,
   Mr. J. S. Brown, Central High School, Detroit.
3. Apparatus and Method for Deriving the Law of Charles,
   Professor F. R. Gorton, Normal College, Ypsilanti.
4. Chemistry in the Technical High School,
   Mr. J. C. Moore, Cass Technical High School, Detroit.

5. Melde's Experiment Amplified,
   Professor H. M. Randall, University of Michigan.
6. Colloidal Chemistry,
   Professor B. W. Peet, Normal College, Ypsilanti.
7. Modern Problems in Physics,
   Professor K. E. Guthe, University of Michigan.
8.
9. Brief Experimental Demonstrations,
10. Report of Committee on Reference Books,
   Professor H. N. Chute, Ann Arbor High School, Chairman of Committee.
11. Business meeting.

MATHEMATICAL CONFERENCE

(Admission by badge)

Thursday Afternoon, April 1

12:45 o'clock. Get-together luncheon.

NEWBERRY HALL TEA ROOM

Chairman—Professor L. C. Karpinski, University of Michigan.
Secretary—Mr. E. F. Gee, Detroit.

2:00 o'clock

NEWBERRY HALL

1. Practical Problems,
   Mr. W. H. Pearce, State Normal College.
2. Practical Mathematics,
   Mr. H. M. Keal, Cass Technical, Detroit.
3. Practical Problems,
   Mr. Wm. Prakken, Highland Park.
4. Practical Geometry,
   Miss M. L. Welton, Grand Rapids.
5. Practical Arithmetic and Algebra,
   Mr. R. M. Sprague, Toledo.
6. Correlation, Arithmetic and Algebra,
   Mr. M. O. Tripp, Olivet.
7. Correlation between Algebra and Geometry,
   Miss M. C. Woodward, Detroit Western.
8. Correlation, Physics and Mathematics,
   Mr. A. Darnell, Detroit Central.
9. Correlation, Mathematics and Agriculture,
   Mr. L. C. Plant, Michigan Agricultural College.

Friday Afternoon, April 2

2:00 o'clock

TAPPAN HALL

10. Practical Problems in Geometry,
    Mr. S. A. Courtis, Detroit.
11. Teaching of Algebra,
    Mr. E. R. Sleight, Albion.
12. Teaching of Algebra,
    Mr. L. P. Jocelyn, Ann Arbor.
13. Some Mistakes in the Teaching of Geometry,
    Mrs. Florence Milner, Detroit University School.
14. Class Room Methods in Geometry,
    Miss Helen Wattles, Detroit Central.
15. Teaching of Geometry,
    L. D. Wines, Ann Arbor.

BIOLOGICAL CONFERENCE

(Admission by badge)

Thursday Afternoon, April 1

1:30 o'clock

PHYSICS LECTURE ROOM

Chairman—LeRoy H. Harvey, Western State Normal.
Secretary—Miss Helen B. King, Saginaw.

Symposium on Elementary Science in the High School Joint Session of the Science Conferences of the Michigan Schoolmasters' Club.

1. Report of the Biological Committee of the N. E. A. Commission on the Reorganization of Secondary Education.
   Dr. LeRoy H. Harvey, Western State Normal.
2. Discussion,
   (a) Mr. W. LeRoy Perkins, Dowagaic.
   (b) Professor S. D. Magers, Northern Normal.
   (c) Mr. De Forest Ross, Ypsilanti.
3. ——————————
4. Open Forum: It is hoped that all interested in this very important subject will participate in the discussion.

Biology Luncheon: 12:30 o'clock Friday, Botanical Laboratory, price 25 cents. Reservations should be made at once; address, Dr. A. E. Ruthven, University Museum, Ann Arbor, Mich.

Friday Afternoon, April 2

2:00 o'clock

MUSEUM

Symposium on Heredity.

5. Mendelism and the Mutation Theory,
 Dr. John S. Dexter, Olivet College.
6. Acquired Characteristics,
 Dr. Bertram G. Smith, State Normal College.
7. Eugenics,
 Dr. A. Franklin Shull, University of Michigan.
8. Open Forum.

COMMERCIAL CONFERENCE

(Admission by badge)

Thursday Afternoon, April 1

2:00 o'clock

ROOM B-8, HIGH SCHOOL

Chairman—Mr. Clarence W. Blanchard, Detroit.
Secretary—

1. What Does the Business Man Demand of the High School?
 Mr. James Strasburg, Office Manager of American Electrical Heating Co., Detroit.
2. What Does the High School Do To Meet the Demand of the Business Man?
 Mr. Chas. B. Bowerman, Head Commercial Department, Central High School, Detroit.
3. Discussion of the papers.
4. Teaching Mechanical Book-keeping with Demonstration of Burroughs' Book-keeping Machine,
 Mr. M. F. Laughlin, Burrougs Co., Detroit.

Friday Afternoon, April 2

2:00 o'clock

5. Teaching Commercial Law to High School Students,
 Professor James C. Reed, Director of Commercial Department of Wisconsin State Normal.
6. Discussion by Principal W. W. Warner, Saginaw.
7. Election of officers.

PHYSIOGRAPHY CONFERENCE

(Admission by badge)

Friday Afternoon, April 2

2:00 o'clock

GEOLOGICAL LABORATORY, ECONOMICS BUILDING

Chairman—Professor E. C. Case, University of Michigan.
Secretary—Miss Helen Martin, Battle Creek.

1. Lakes and Lake Shores in Michigan,
   Professor I. D. Scott, University of Michigan.
2. High School Physiography,
   Miss Louise F. Markley, University of Michigan.
3. Physiography or Geography—Which?
   Superintendent F. W. Frostic, St. Charles.
4. Report on the Propositions of the N. E. A. Relative to the Proposed General Science Course in the High Schools,
   Mr. W. L. Perkins, Dowagiac.
5. Physiography in Preparatory Schools,
   Mr. Emanual M. Clark, Ferris Institute.
6. Illustrations of the Physiography of the Semi-Arid Regions,
   Professor E. C. Case, University of Michigan.

(Note:—See notice in program of General Sessions of Professor Hobbs' lecture on Earthquakes.)

ART CONFERENCE

(Admission by badge)

Thursday Afternoon, April 1

2:00 o'clock

ROOM A, MEMORIAL HALL

Chairman—Harry M. Kurtzworth, Muskegon.
Secretary—Charlotte W. Calkins, Grand Rapids.

For the Advancement of the Personal, Domestic, Industrial and Civic Appreciation of Beauty through the Educational Facilities of the State of Michigan.

(Talks limited to twenty minutes, to be typed if possible.)

SURVEY—

1. Brief History of Art Education in Michigan,
   Miss Alice V. Guysi, Chairman, Director of Art, Detroit.
2. Aims of Past Art Instruction,
   Miss Virginia Jackson, Eastern High School, Detroit.
3. Methods Used,

PLAN—

4. Present Results of Art Teaching,
   Miss Bertha Goodison, State Normal College.
5. Opportunities of Improving Present Methods from the Educational Standpoint,
   Miss Lida Clark, State Normal College.
6. Suggestions for Improving Art Education from the Professional Standpoint, illustrated with examples,
   Mr. Paul Honoré, Painter, Detroit.

FULFILLMENT—

7. Means to be used for Fulfilling Plans for Better Art Education,
   Professor Emil Lorch, University of Michigan.

EXHIBITS—

Exhibit of Michigan School Art Assembled by
Miss Emelia Goldsworthy, Western State Normal.

Illustrations and Decorations by
Mr. Paul Honoré, Detroit.

Work of Architectural College of University of Michigan,
Arranged by Mr. Raymond Everett, University of Michigan.

Reproductive Processes,
Loaned by Theodore W. Koch, Librarian, University of Michigan.

Note: The program is a preliminary step in planning the big meeting of 1916, when the Art Department appears on the General program to show:

1. What Art should be taught in High School,
2. Why it should be taught,
3. How Art should be taught in Secondary Schools.

MANUAL TRAINING CONFERENCE

(Admission by badge)

Friday Afternoon, April 2

2:00 o'clock

ROOM C-1, HIGH SCHOOL

Chairman—Mr. J. H. Trybom, Detroit.

Secretary—Mr. F. R. Kepler, Detroit.

What should be accomplished by the instruction in Mechanical Drawing in the High Schools from the following View Points:—

1. The University,
   Professor John R. Allen, Head of the Department of Mechanical Engineering, University of Michigan.
2. The Drafting Room,
   Mr. Frederich R. Still, Chief Engineer, Am. Blower Co., Detroit.
3. The Technical High School,
   F. R. Kepler, Head of the Instruction in Mechanical Drawing, Cass Technical High School, Detroit.
4. The Junior High School,
   Principal Paul C. Stetson, Junior High School, Grand Rapids.
5. The Cultural Aspect,
   Mr. H. M. Kurtzworth, Head of Drawing and Arts Departments, Hackley Manual Training High School, Muskegon, Mich.

EDUCATIONAL PSYCHOLOGY CONFERENCE

(Admission by badge)

Thursday Afternoon, April 1

2:00 o'clock

HIGH SCHOOL PHYSICS ROOM

Chairman—Dr. C. S. Berry, University of Michigan.
Secretary—Professor H. C. Lott, State Normal College.

1. An Experimental Study of Some Problems in the Teaching of Spelling,
   Dr. F. S. Breed, University of Michigan.
2. Discussion of No. 1,
   Superintendent H. M. Slauson, Ann Arbor.
3. Limitation in Training as a Factor in the Elimination of Waste in Education,
   Assistant Superintendent Chas. L. Spain, Detroit.
4. Discussion of No. 3,
   Professor S. B. Laird, State Normal College.
5. General Discussion.

REPORT OF COMMITTEE ON A BOOK LIST FOR PHYSICS

GENERAL.

Carhart, H. S.—College Physics.—Allyn & Bacon	$ 2.25
Reed & Guthe.—College Physics.—MacMillan Co	2.75
Watson, W.—A Text Book of Physics.—Longmans, Green & Co	3.50
Ganot (Atkinson).—Physics.—Wm. Wood & Co	5.00
Soddy, F.—Brownian Movement and Molecular Reality.—Taylor & Francis	1.90
Gibson, Charles.—Scientific Ideas of Today.—Lippincott Co	1.50
Ball, R. S.—Time and Tide.—E. and J. P. Young & Co	.80
Tyndall, John.—Fragments of Science.—D. Appleton & Co	2.50
Boys, C. V.—Soap Bubbles.—E. and J. B. Young & Co	.80
Young, Chas. A.—General Astronomy.—Ginn & Co	2.75
Threlfall, Richard.—Laboratory Arts.—MacMillan Co	.70
Fowle, Frederick E., Physical Tables.—Smithsonian Institution	2.00
Poynting & Thomson.—Text Book on Physics.—Lippincott Co.	
Duncan, Robert Kennedy.—The New Knowledge.—A. S. Barnes & Co	2.00
Whetham, W. C. D.—The Recent Development of Physical Science.—P. Blakiston, Son & Co.	2.00
Woollatt, G. H.—Laboratory Arts.—Longmans, Green & Co	1.50
Poincaré, Lucien.—The New Physics.—D. Appleton & Co	2.25
Ames, J. S.—Constitution of Matter.—Houghton, Mifflin & Co	1.50

HISTORY.

Lodge, Oliver J.—Pioneers of Science.—MacMillan Co	$ 2.50
Routledge, Robert.—Discoveries and Inventions of the Nineteenth Century.—Routledge	3.00
Thompson, S. P.—Michael Faraday, His Life and Work.—MacMillan Co	1.25
Glazebrook, R. T.—James Clark Maxwell and Modern Physics.—MacMillan Co.	1.25
Cajori, F.—A History of Physics.—MacMillan Co	1.60
Williams, Henry Smith.—A History of Science.—Harper & Bros	22.00

MECHANICS.

Maxwell, J. Clerk.—Matter and Motion.—D. Van Nostrand Co	$ .50
Soddy, Frederick.—Matter and Energy.—Henry Holt & Co	.50
Tait, P. G.—Properties of Matter.—MacMillan Co	2.50
Lodge, Oliver J.—Elementary Mechanics.—Ward R. Chambers	1.50
Glazebrook, R. T.—Mechanics and Hydrostatics.—Cambridge University Press.	2.00
Perry, John.—Spinning Tops.—E. and J. B. Young & Co	.80

SOUND.

Blaserna, P.—Theory of Sound.—D. Appleton & Co	$ 1.00
Tyndall, John.—Sound.—D. Appleton & Co	2.00
Mayer, A. M.—Sound.—D. Appleton & Co	1.00
Barton, Edwin H.—A Text Book of Sound.—MacMillan Co	3.00
Logan, Maurice S.—Musicology.—Hinds, Noble & Eldredge	1.50

LIGHT.

Thompson, S. P.—Light, Visible and Invisible.—MacMillan Co..............$ 2.00
Wright, Lewis.—Light.—MacMillan Co.............................. 2.00
Wright, Lewis.—Optical Projection.—Longman, Green & Co.................. 2.25
Lommel, E.—Nature of Light.—D. Appleton & Co......................... 2.00
Edser, Edwin.—Light for Advanced Students.—MacMillan Co................ 1.50
Rood, Ogden N.—A Text Book of Color.—D. Appleton & Co................. 2.00
Johnson, G. L.—Photography in Colors.—E. P. Dutton & Co................ 1.25
Lodge, Oliver J.—The Ether of Space.—Harper & Bros...................... .75
Gage, S. H. and H. P.—Optic Projection.—Comstock Pub. Co................ 3.00

HEAT.

Maxwell, J. Clerk.—Theory of Heat.—Longman, Green & Co.................$ 1.50
Madan, H. G.—Elementary Treatise on Heat.—Longman, Green & Co.......... 3.00
Tyndall, John.—Heat Considered as a Mode of Motion.—D. Appleton & Co..... 2.50
Randall.—Heat.—Wiley & Son.. 1.50
Edser, Edwin.—Heat for Advanced Students.—MacMillan & Co............... 1.50
Glazebrook, R. T.—Heat.—MacMillan & Co.............................. 1.00
Larden, W.—A School Course on Heat.—Sampson Low & Co.................. 1.65
Snow & Leland.—The Steam Engine.—American School of Correspondence..... 1.00
Hiscock, Gardner D.—Gas, Gasoline and Oil Vapor Engine.—Henley Pub. Co... 2.50

ELECTRICTY.

Lodge, Oliver J.—Modern Views of Electricity.—MacMillan Co..............$ 2.50
Thompson, S. P.—Electricity and Magnetism.—MacMillan Co................ 1.40
Ashe, S. W.—Electricity Experimentally and Practically Applied.—D. Van Nostrand Co. 2.00
Henry & Hora.—Modern Electricity.—Laird & Lee.......................... 1.00
Erskine-Murray, James.—Wireless Telegraphy.—Crosby, Lockwood & Co...... 2.75
Morgan, Alfred P.—Wireless Telegraphy Construction for Apparatus.—D. Van Nostrand Co. 1.50
Atkinson, A. A.—Electrical and Magnetic Calculation.—D. Van Nostrand Co.. 1.50
Fleming, J. A.—Waves and Ripples in Water, Air, and Ether.—E. and J. B. Young & Co. 2.00
Wright, Lewis.—The Induction Coil in Practical Work.—MacMillan Co........ 1.25
Gibson, Charles R.—The Romance of Modern Electricity.—J. B. Lippincott Co. 1.50
Lodge, Oliver J.—Electrons.—Geo. Bell & Sons........................... 2.00
Thomson, J. J.—Electricity and Matter.—Scribner's Sons.................. 1.25
Thomson, J. J.—Rays of Positive Electricity.—Longmans, Green & Co........ 1.25
Rutherford, E.—Radioactive Substances and Their Radiations.—Cambridge University Press 4.00

A TEN DOLLAR LIST.

Cajori's History of Physics ....$ 1.60
Soddy's Matter and Energy .... .50
Lodge's Mechanics 1.50
Blaserna's Theory of Sound 1.50
Lommel's Nature of Light.. 2.00

Madan's Heat	3.00
Thompson's Electricity and Magnetism	1.40
Total	$ 11.50

A TWENTY-FIVE DOLLAR LIST.

Add the following:—

Smithsonian Physical Tables	$ 2.00
Tait's Properties of Matter	2.25
Perry's Spinning Tops	.80
Boy's Soap Bubbles	.80
Woollatt's Laboratory Arts	1.50
Thompson's Light, Visible and Invisible	1.50
Lodge's Modern Views of Electricity	2.50
Morgan's Wireless Telegraphy	1.50
Gibson's Scientific Ideas of Today	1.50
Lodge's Ether of Space	.75
Total	$ 26.60

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Bishop, Helen L.
Blanchard, C. W.
Chase, Ethel W. B.
Copeland, Cornelia A.
Darnell, Albertus
Dillon, Florence G.
Fishbaine, S. S.

Flintermann, Emilie A.
Gee, E. F.
Goldman, Miriam D.
Haug, Bernice L.
Hine, Katherine G.
Hull, Isabella H.
Irwin, F. C.
Isbell, W. N.
Levin, S. M.
Mackenzie, David
Malcomson, Rachel A.
Miner, Mary L.
Mutschel, Matilda
Power, Mary F.
Roby, Anne M.
Stocking, W. R., Jr.
Thompson, E. C.
Thompson, Margaret E.
Watt, Isabella R.
DETROIT EASTERN
Bishop, J. R.
Harvey, Caroline C.
Pettee, Edith E.
Strubel, R. H.
DETROIT THE LIGGETT
Liggett, Miss J. M.
DETROIT, MARTINDALE NORMAL
Conover, L. Lenore
Fleming, Jennie M.
DET. McMILLAN
Hall, C. F.
DETROIT NORTHWESTERN
Alley, Sadie M.
Chapman, I. E.
Corns, J. H.
Miller, E. L.
Rivett, B. J.
Wagner, T. E.
Wentworth, Wm. H.
Whitney, Edward
DETROIT WESTERN
Bancroft, Nellie E.
Elliott, Lucy
Farnsworth, Mary F.
Frutig, Marie L.
Hempsted, Johanna K.
Hendershott, E. Pearl
Hickok, D. W.
Holmes, E. L.
Holmes, F. H.
McMillan, D. W.
Marquardt, Helena
Matthews, J. W.
Meiser, Augusta B.
Morse, W. A.
Pitts, Dora
Roper, Gertrude
Sundstrom, Elizabeth
Tower, Ethel L.
Waples, Marcia
Weir, W. W.
Wilkinson, A. O.
Wiltsie, Katherine D.
FENTON
Cody, E. E.
Lyons, D. F.
FERRIS INSTITUTE
Ferris, W. N.
FLINT
Ballard, Edna L.
Cody, A. N.
Gold, Mary E. S.
Nutt, H. D.
Parmlee, L. S.
Puffer, W. J.
Wellwood, J. E.
Wright, L. L.
GRAND RAPIDS
Calkins, Charlotte W.
Davis, Jesse B.
Ellis, Grace F.
Greeson, W. A.
Hulst, Cornelia S.
Jones, Anna S.
Stearns, Frances L.
Stetson, P. C.
HASTINGS
Hinckley, C. G.
HIGHLAND PARK
Knapp, Thad J.
Leonard, G. O.
Locke, J. R.
Margah, Mrs. Katherine C.
Mumford, E. H. E.
Prakken, Wm.
Van Loon, G. E.
HILLSDALE COL.
Mauck, J. W.
HOWELL
Abell, E. L.
McDowell, Prudence
IONIA
Forsythe, L. L.
JACKSON
Britten, Caroline E.
Marsh, E. O.
Watkins, E. E.
KALAMAZOO
Hartwell, S. O.
Worth, E. N.
KALAMAZOO COL.
Praeger, W. E.
Williams, C. B.
Williams, Geo. A.
LANSING
Ammerman, Laura B.
LINDEN
Burr, C. J.
MANCHESTER
Kirchhofer, Marie
MARINE CITY
Hazelton, R.
MARSHALL
McDiarmid, L. A.
MENDON
Loomis, F. H.
MONROE
Gallup, E. E.
Gilday, Selma
Highley, A. M.
Wagner, Martha
MUSKEGON
Craig, J. A.
Frost, J. M.
Kurtzworth, H. M.
NORMAL COLLEGE
D'Ooge, B. L.
Elliott, C. M.
Ford, R. C.
Goddard, Mary A.
Gorton, F. R.
Harvey, N. A.
Jones, L. H.
Laird, S. B.
Lott, H. C.
Lyman, E. A.
Muir, Helen B.
Norris, O. O.
Pearce, W. H.
Peet, B. W.
Strong, E. A.
Wilber, H. Z.
NORTH CRYSTAL LAKE, ILL.
Ashleman, Lorley A.
NORTHERN NORMAL
Spooner, C. C.
OAK PARK, ILL.
Lee, L. B.
OWOSSO
Allison, Clara J.
Longman, M. W.
OXFORD, OHIO
Bishop, Elizabeth L.
PONTIAC
Dudley, S. M.
Harris, Pauline
Jenner, G. L.
McCarroll, Sarah
Travis, Ora
PORT HURON
Crane, Mrs. S. A.
Davis, H. A.
Easton, A. J.
Fyan, Lila E.
Lewis, W. F.

Staley, Ethel
RIVER ROUGE
McDonald, A.
SAGINAW
King, Helen B.
Tanis, J. E.
Warner, W. W.
Warriner, E. C.
ST. CHARLES
Frostic, F. W.
ST. JOHNS
Buck, F. P.
Daboll, Winifred C.
STOCKBRIDGE
Sprinkle, R. W.
SUPERIOR, WIS.
Wade, C. G.
SWARTHMORE, PA.
Dennison, Walter
TOLEDO, OHIO
Kimball, Edith M.
TRAVERSE CITY
Tyler, L. L.
TUSTIN
Gould, Wm. E.
UNIVERSITY
Angell, J. B.
Beman, W. W.
Berry, C. S.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Butler, Orma F.
Canfield, A. G.
Crittenden, A. R.
Cross, A. L.
Diekhoff, Tobias
Dow, E. W.
Edmonson, J. B.
Effinger, J. R.
Field, Peter
Finney, B. A.
Glover, J. W.
Guthe, K. E.
Hall, A. G.
Hauhart, Wm. F.
Hildner, J. A. C.
Hutchins, H. B.
Karpinski, L. C.
Kelsey, F. W.
Kraus, E. H.
Leverett, Frank
Lichty, D. M.
Lorch, Emil
Markley, J. L.
Meader, C. L.
Nelson, J. R.
Newcombe, F. C.
Pollock, J. B.
Rich, D. L.
Running, T. R.
Scott, F. N.
Scott, I. D.
Sleator, Wm. W.
Swain, Geo. R.
Tatlock, J. S. P.
Trueblood, T. C.
Wenley, R. M.
Williams, N. H.
Winkler, Max
Winter, J. G.
Ziwet, Alexander
VICKSBURG
Smith, P. H.
WAYNE
Raycraft, R. E.
WESTERN NORMAL
Burnham, Ernest
Everett, J. P.
Harvey, L. H.
Hickey, T. P.
Waldo, D. B.
WYANDOTTE
Smith, Ross H.
YPSILANTI
Arbaugh, W. B.
Hardy, Carrie A.
Ross, DeForest
Steere, Edith A.

List of Members for 1915

ADRIAN
Connely, Mildred M.
Griffey, C. H.
Priddy, Bessie L.
Schaible, Ida M.
Richard, Alice
Van Auken, Blanche
ALBION
Barr, Mary E.
Swigart, R. G.
ALBION COLLEGE
Barr, C. E.
Fall, Delos
Goodrich, F. S.
Greene, C. W.
Sleight, E. Roscoe
ALGONAC
Ticknor, Frances
ALLEGAN
Fitch, Albert
ALPENA
Wykoff, Veda
ANN ARBOR
Adams, O. V.
Aiken, W. M.
Benham, A. S.
Bennett, Ella M.
Brightman, Hazel
Brown, Jessie
Chute, H. N.
Cornwell, Matie P.
Dicken, Carrie
Essery, E. E.
George, Louise
Goodell, F. Maude
Granville, Robt.
Gundert, Emily
Hamilton, F. G.
Hamilton, Mrs. F. G.
Head, W. F.
High, J. B.
Jocelyn, L. P.
Luce, Mrs. E. E.
Lusby, Lulu V.
McAllister, H. A.
McDonald, Grace
Magdalene, Sister M.
O'Brien, Sarah
Palmer, Mrs. J. V.
Porter, Alice
Purtell, Catherine
Rennie, Florence M.
Robison, Cora
Robson, Louise
Rolfe, E. C.
Rosenthal, Henrietta
Rotzel, Grace
Schmidt, T. J.
Slauson, H. M.
Spaulding, A. E.
Springer, D. W.
Tinkham, Lona C.
Walsh, May
Weinmann, Louise
West, F. J.
West, Jeannette S.
Wines, L. D.
Wright, Wm. R.
BATTLE CREEK
Allwardt, H. K.
Atkinson, H. R.
Benson, Walfred
Coburn, W. G.
Cross, Mabel
Krell, Carrie
Mann, Jessie
Marshall, Anna E.
Martin, Helen M.
Sharpe, E. Alma
York, W.
BAY CITY
Gates, Mrs. E. L.
German, W. L.
Hughes, H. D.

Hunker, Emma G.
Liskow, Julia
McVittie, Alex
Rich, L. H.
Sharpe, E. M.
Sloan, N. B.
Taylor, Harriet L.
Wells, Berta A.
BELDING
Nielson, N. C.
BENTON HARBOR
Snyder, F. P.
BENZONIA
Norwalk, O. F.
BIG RAPIDS
Anderson, Florence
Head, LeRoy S.
BOYNE CITY
Butler, L. A.
DeLano, Agnes
CADILLAC
Porter, J. E.
Smellie, D. G.
CAPAC
Armstrong, Alice
CASS CITY
Caldwell, Ada
CEDAR SPRINGS
Butler, Edith M.
Luidens, J. E.
CENTRAL NORMAL
Allen, Maude E.
Barnard, Anna M.
Grawn, C. T.
Larzelere, C. S.
Woldt, Mae K.
CHARLOTTE
Carrick, C. H.
Howard, Lillian E.
Van Kleek, Mabel
CHEBOYGAN
Barr, W. L.
CHELSEA
Belser, Leona M.
King, Ruth
CHESANING
McKim, Ora
CHICAGO, ILL.
Boyer, C. J.
Brooker, A. G.
Johnson, H. M.
King, J. C.
Woodhams, J. W.
CLEARY'S BUS. COL.
Cleary, P. R.
COLDWATER
Bechtel, G. A.
Johnson, T. E.
Severnance, Ruby L.
CORUNNA
Johnson, C. R.
CROSSWELL
Manning, G. F.
DEARBORN
Salisbury, H. A.
DECATUR
Willison, Mabel C.
DETROIT
Arbury, F. W.
Barns, B. A.
Beverley, Clara
Bogenrieder, Gertrude
Chadsey, C. E.
Cody, Frank
Courtis, S. A.
Dillon, Elizabeth F.
Eagleson, Stuart
Frederick, O. G.
Fox, E. J.
Gardner, Lucy
Gibb, H. L.
Guysi, Alice V.
Hopper, B.
Hull, L. C.
Lightbody, W. M.
Linn, Flora R.
McBee, A. L.
McSweeney, Katherine
Mandeville, J. M.
Merrill, J. W.
Novak, C. M.
Ripley, Alice
Sexton, Mrs. K. C.
Shaw, E. R.
Skinner, Frances H.
Smith, A. T.
Spain, C. L.
Spicer, C. E.
Stevens, R. W.
Trybon, J. H.
Yokom, M. C.
Yost, E. W.
DETROIT CASS TEC.
Allen, E. G.
Cooke, C. S.
Cooper, L. G.
Daly, Chas.
Howlett, R. S.
Kepler, F. R.
McDougal, W. A.
Maxwell, G. W.
Phelps, Nancy S.
Skeels, A. D.
DETROIT CENTRAL
Bartlett, A. E.
Bates, F. O.
Bishop, Mrs. H. A.
Bishop, Helen L.
Blanchard, C. W.
Bowerman, C. B.
Brown, J. S.
Burgess, L. G.
Camp, Mary F.
Chase, Ethel W. B.
Copeland, Cornelia A.
Darnell, Albertus
Dillon, Florence G.
Eames, C. E.
Fishbaine, S. S.
Flintermann, Emilie A.
Frost, H. H.
Gee, E. F.
Goldman, Miriam D.
Haug, Bernice L.
Hine, Katherine G.
Hull, Isabella H.
Irwin, F. C.
Isbell, W. N.
Jones, Grace E.
Levin, S. M.
Mackenzie, David
Malcomson, Rachel A.
Millard, Grace G.
Miner, Mary L.
Mutschel, Matilda
Power, Mary F.
Roby, Anne M.
Stocking, W. R. Jr.
Thompson, E. C.
Thompson, Margaret
Tompkins, F. G.
Torr, Mary D.
Watt, Isabella R.
Wattles, Helen
Wicks, Louise
DETROIT EASTERN
Bishop, J. R.
Browne, E. Mae
Fuhry, E. G.
Grant, J. F.
Harvey, Caroline C.
Kolb, Marguerite
Marsh, Alice L.
Pettee, Edith E.
Struble, R. H.
DETROIT, GEORGE JR.
Mote, E. L.
Woodward, W. H.
DETROIT, THE LIGGETT
Liggett, Miss J. M.
DET. McMILLAN
Bow, W. E.
Hall, C. F.
Murdock, G. W.
DETROIT MARTINDALE NORMAL
Conover, L. Lenore
Fleming, Jennie M.
Gillmore, Gertrude A.
Haigh, Margaret

DETROIT
UNIV. SCHOOL
Milner Florence
Searle, F. E.
DETROIT NORTH-WESTERN
Alley, Sadie M.
Chapman, Ivan E.
Corns, J. H.
Jones, A. F.
Merriam, Beatrice
Miller, E. L.
Rivett, B. J.
Sutherland, Olive M.
Wagner, T. E.
Wentworth, Wm. H.
Whitney, Edward
Wilson, Jean W.
DETROIT WESTERN
Bancroft, Nellie E.
Elliott, Lucy
Farnsworth, Mary F.
Frutig, Marie L.
Hempsted, Johanna K.
Hendershott, Pearl
Hickok, D. W.
Holmes, E. L.
Holmes, F. H.
McMillan, D. W.
Marquardt, Helena
Matthews, J. W.
Meiser, Augusta B.
Morse, W. A.
Parker, Flora E.
Pitts, Dora
Porter, E. H.
Roper, Gertrude
Smalley, Harriet M.
Sundstrom, Elizabeth
Towar, Ethel L.
Waples, Marcia
Warner, W. E.
Weir, W. W.
Wilkinson, A. O.
Wiltsie, Katherine D.
Woodward, Mabel C.
DOWAGIAC
Perkins, W. L.
DRYDEN
Inglis, S.
EATON RAPIDS
Overholt, Lura M.
EAST LAKE
Sawyer, Vernon
FENTON
Cody, E. E.
Lyons, D. F.
FERRIS INSTITUTE
Clark, E. M.
Ferris, W. N.
FLINT
Ballard, Edna L.
Cody, A. N.
Gold, Mary E. S.
McKinney, Nellie
Nutt, H. D.
Parmelee, L. S.
Pratt, L. A.
Puffer, W. J.
Russell, W. J.
Wellwood, J. E.
Wightman, E. R.
Williams, Bertha A.
Wright, L. L.
FLUSHING
Parker, W. E.
FORD CITY
Pike, C. F.
GOSHEN, IND.
Rosenthal, B. F.
GRAND HAVEN
Hoekje, J. C.
Selden, A. W.
GRASS LAKE
Dorr, A. W.
GRAND RAPIDS
Broome, Amy L.
Calkins, Charlotte W.
Carpenter, C. M.
Christ, Helen C.
Creswell, Cordelia
Davis, Jesse B.
Dockeray, Eva L.
Ellis, Grace F.
Greeson, W. A.
Hinsdale, Mildred
Hulst, Cornelia S.
James, Alice M.
Jennings, Marion L.
Jones, Anna S.
Muyskens, J. H.
Rinck, Wm.
Schweitzer, Louise
Smith, B. E.
Stearns, Frances L.
Stetson, P. C.
Switzer, C. F.
Van Buren, Agnes
Van de Velde, Alice
Welton, Mary L.
GROSSE ISLE
Runciman, C. H.
HAMTRAMACK
Van Deventer, E. G.
HARBOR SPRINGS
Beadle, W. B.
HARTFORD
Smith, B. Earl
HASTINGS
De Yoe, Bessie, M.
Ellsworth, F. E.
Hinckley, C. G.
Meier, Alexina
HIGHLAND PARK
Babcock, Lulu
Bacon, Josephine
Fletcher, Rachel
Graves, Marie
Knapp, T. J.
Leonard, G. O.
Locke, Frances
Locke, J. R.
Margah, Mrs. Katherine C.
Mumford, E. H. E.
Potter, E. G.
Prakken, Wm.
Roger, Esca
Streator, Emma
Van Loon, G. E.
Whitney, Beulah G.
Yorks, Anna M.
HILLSDALE COL.
Holmes, R. H.
Mauck, J. W.
HOLLAND
Haefliger, Eleanor
Pettit, H. P.
Post Catherine
HOPE COLLEGE
Elias, Edward
Hoffman, M. G.
HOWELL
Abell, E. L.
Bigalke, Irene
Horine, R. C.
Krakan, Lena
McDowell, Prudence
Wells, Eunice
IONIA
Barlow, Edna
Carey, Eleanor J.
Forsythe, L. L.
Jenks, Caroline
Martiny, Clara
IRONWOOD,
Gibson, Helen
ITHACA
Smith, F. R.
JACKSON
Bartoo, G. C.
Bliss, F. L.
Bosier, M. L.
Britten, Caroline E.
Holland, C. F.
Kempf, Flora
Marsh, E. O.
Paschke, L. A.
Trumble, O. S.
Watkins, E. E.

JONESVILLE
Langston, J. A.
Smith, Lucile
KALAMAZOO
Bach, Ellen B.
Chamberlin, N. T.
Doolittle, W. C.
Gregg, Jessie S.
Hall, H. P.
Hammond, H. E.
Hartwell, S. O.
Hyames, A. L.
Merrill, P. E.
Starkweather, J. A.
Worth, E. N.
KALAMAZOO COL.
Praeger, W. E.
Williams, C. B.
Williams, G. A.
LANSING
Ammerman, Laura B.
Bishop, E. J.
Gridley, N. B.
Hall, Florence L.
Le Furge, C. E.
Lyon, I. E.
McKibbin, Mae E.
Munson, J. M.
Pattengill, H. R.
LAWRENCE
Martin, G. L.
LINDEN
Burr, C. J.
LUDINGTON
Griffith, C. E.
MANCHESTER
Kirchhofer, Marie
Smith, G. A.
MANISTEE
Kress, Margaret
Steele, Anna
MARINE CITY
Hazelton, R.
MARSHALL
McDiarmid, L. A.
MASON
Kennedy, J. E.
MENDON
Loomis, F. H.
MENOMINEE
Woessner, Anna L.
MICH. AGRI. COL.
Bessey, Ernst A.
Fischer, E. G.
Plant, L. C.
Snyder, J. L.
Speeker, G. G.
MIDLAND
Mott, J. B.
MT. CLEMENS
Albano, Hazel
Eddy, Leo L.
MONROE
Cantrick, G. T.
Cecile, Sister Marie
Gallup, E. E.
Gilday, Selma
Highley, A. M.
Quigley, Mary
Servis, L. R.
Spencer, D. S.
Wagner, Martha
MUSKEGON
Bennett, J. G.
Cleveland, J. B.
Craig, J. A.
Dannenfelser, F. M.
Frost, J. M.
Kurtzworth, H. M.
NEW BALTIMORE
Clark, A. H.
Hills, Mrs. Rex
NEWBERRY
Koepfgen, L. P.
NEW CASTLE, IND.
Sheehan, Genevieve M.
NORMAL COLLEGE
Blackman, Edith
Blount, Alma
Clark, Genevieve
Clark, Lida
D'Ooge, B. L.
Elliott, C. M.
Fleischer, Ida
Ford, R. C.
Gardner, Emilyn E.
Garner, Lota H.
Goddard, Mary A.
Goodison, Bertha
Gorton, F. R.
Harvey, N. A.
Jones, L. H.
Laird, S. B.
Lott, H. C.
Lyman, E. A.
McKaye, F. B.
McKenny, Chas. C.
Matteson, Jane L.
Muir, Helen B.
Norris, O. O.
Norton, Ada A.
Pearce, W. H.
Peet, B. W.
Pray, Carl E.
Putnam, Mary B.
Sherzer, W. H.
Shultes, Florence
Smith, Bertram G.
Strong, E. A.
White, Marion B.
Wilber, H. Z.
NORTH CRYSTAL LAKE, ILL.
Ashleman, Lorley A.
NORTHERN NORMAL
Magers, S. D.
Spooner, C. C.
OAK PARK
Lee, L. B.
OLIVET
Dexter, J. S.
Nadal, T. W.
Parker, Sophy D.
Tripp, M. D.
OTSEGO
Fast, L. W.
OWOSSO
Allison, Clara J.
Longman, M. W.
OXFORD, OHIO
Bishop, Elizabeth L.
PONTIAC
Allen, D. C.
Dudley, S. M.
Harris, Pauline
Jenner, G. L.
McCarroll, Sarah
Springman, J. C.
Travis, O.
PORT HURON
Braun, Nora
Brown, Frances
Chapin, Allie B.
Crane, Mrs. S. A.
Davis, H. A.
Easton, A. J.
Fyan, Lila E.
Lewis, W. F.
Staley, Ethel
READING
Dalrymple, J. A.
RICHMOND
Campbell, Mary E.
RIVER ROUGE
Grant, Lee
McDonald, A.
ROYAL OAK
Hunter, R. B.
Lederle, E. J.
SAGINAW
Baker, M. B.
Hach, C. A.
King, Helen B.
Langdon, J. W.
Lange, H. C.
Nash, M. Estelle
Nicolson, Marjorie
Tanis, J. E.
Warner, W. W.
Warriner, E. C.

ST. CHARLES
Frostic, F. W.
ST. JOHNS
Buck, F. P.
Daboll, Winifred C.
SARANAC
Ettinger, L. P.
SAUGATUCK
Smith, W. H.
SAULT ST. MARIE
Bryan, C. H.
Mahon, Winifred B.
SOUTH HAVEN
Allen, H. B.
McAlpine, D. P.
STOCKBRIDGE
Sprinkle, R. W.
STURGIS
Rockwood, H. L.
SUPERIOR, WIS.
Wade, C. G.
SWARTHMORE, PA.
Dennison, Walter
TECUMSEH
Mingay, Nellie
TOLEDO, OHIO
Kimball, Edith M.
Ryan, May
Sprague, R. M.
TRAVERSE CITY
Tyler, L. L.
TROY
Churchill, F. M.
TUSTIN
Gould, Wm. E.
UNION CITY
Bassett, Georgiana
UNIVERSITY
Angell, J. B.
Beman, W. W.
Berry, C. S.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Bursley, P. E.
Butler, Miss O. F.
Canfield, A. G.
Case, E. C.
Cole, H. N.
Cook, C. W.
Crittenden, A. R.
Cross, A. L.
Davis, C. O.
Diekhoff, Tobias
Dow, E. W.
Edmonson, J. B.
Effinger, J. R.
Field, Peter
Finney, B. A.
Ford, W. B.
Glaser, O. C.
Glover, J. W.
Goulding, H. J.
Guthe, K. E.
Hall, A. G.
Hauhart, W. F.
Henderson, W. D.
Hildner, J. A. C.
Hobbs, W. H.
Hollister, R. D. T.
Hunt, W. F.
Hutchins, H. B.
Jackson, G L.
Jordan, Myra B.
Karpinski, L. C.
Kelsey, F. W.
Kraus, E. H.
Lee, A. O.
Leverett, Frank
Levi, M.
Lichty, D. M.
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Lorch, Emil
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JOURNAL

OF THE

Michigan Schoolmasters' Club

FIFTY-FIRST MEETING

Held in Ann Arbor, March 29, 30, 31, 1916

ANN ARBOR, MICHIGAN

PUBLISHED BY THE CLUB

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Michigan Schoolmasters' Club

PROCEEDINGS OF THE FIFTY-FIRST MEETING, HELD AT ANN ARBOR, MARCH 29-31, 1916.

EDITED BY THE SECRETARY.

GENERAL MEETING

The fifty-first meeting of the Michigan Schoolmasters' Club began on Wednesday, March 30, with meetings of the Classical Conference and of the Principals' Association.

The General Sessions of the Club were held on Thursday and Friday mornings in the Auditorium of the new Science Building. Thursday morning was given over to the teachers of Art. Professor M. E. Cooley, Dean of the Colleges of Engineering and Architecture of the University presented a paper upon "The Drawing Instinct in Primitive Man," Dr. James P. Haney, Director of Drawing in the High Schools of New York City, upon "Art in Harness," and Dr. Royal Bailey Farnum, Supervisor of Drawing and Industrial Training, State of New York, upon "The Purpose of Art Education in the High School." All of these papers are printed in these Proceedings.

On Friday morning Professor Allan S. Whitney, Head of the Educational Department of the University of Michigan, read the results of his investigations upon "The Status of School Superintendents, Principals, and Teachers in the High Schools of Michigan," and Professor C. H. Judd, Head of the School of Education of Chicago University, gave an address on "How to Make Scientific Studies in Education More Effective." Professor Whitney's report is published in the Proceedings.

The members of the club were fortunate in being able to attend the University Lectures given by Professor Paul van den Ven of the University of Louvain, Belgium, Dr. E. A. Loew of the University of Oxford, England, and Miss Ellen Churchill Semple, of the University of Chicago.

Special mention should be made of the Latin Play—"The Menaechmi of Plautus," which was presented by the Classical Club of the University of Michigan, and which proved a success in every way.

The Young Ladies' Gymnastic Demonstrations, under the supervision of Miss Evans and Miss Wood, were of unusual excellence, and were well attended.

For the first time in the history of the Club both the President and the Vice-President were absent, President Mauck being in Honolulu, and Miss Gold being in Baltimore, Md. The Secretary-Treasurer asked Miss Alice V. Guysi, Director of Drawing, Detroit, and chairman of the art program, to preside at the Thursday morning Session, and Mr. Lawrence Cameron Hull, of Detroit, to preside at the Friday morning Session. Mr. Hull was thus honored because he is the father of the Club and was its first president thirty years ago. It thus happened that Mr. Hull presided at the first and at the fifty-first meetings of the Club.

Before introducing the speakers, Mr. Hull gave an interesting talk upon the founding of the club and of its history to the present time. He said the Club was formed for the purpose of banding together the schoolmen of the State and then bringing them and the men of the University into closer relations, so that the educational system of the State might be a unit. The Club has, to a large extent, accomplished these things.

Formerly the Club met in a single room in the North Wing of the College of Literature, Science, and the Arts. Now it occupies the best rooms on the Campus and in the high school, and has two General Sessions and thirteen Conferences. This is a growth beyond the expectations of its founders.

THE DRAWING INSTINCT IN PRIMITIVE MAN.

MORTIMER E. COOLEY,
DEAN OF THE COLLEGES OF ENGINEERING AND ARCHITECTURE,
UNIVERSITY OF MICHIGAN.

The title of my paper as originally announced was "The Art Instinct in Primitive Man."

As much as I was flattered by the use of the word *art,* I felt I had instantly to proclaim myself not guilty. I know almost nothing about art and still less about primitive man. I do, however, know something about children, boys and girls, young men and women, and old folk. And if we are to believe with those who hold that civilization is but a coat of varnish on the wild man, then perhaps I shall not be so far off my subject as it was originally announced.

My plea is for more attention to the subject of drawing in our primary and secondary schools—not mechanical drawing, but *freehand* drawing. We as a people are becoming altogether too mechanical, as I see it, and need for

our own good and the fuller enjoyment of life to get back again closer to nature. All unconsciously we have jogged along first on foot, then on horseback, in the stage coach, the canal boat, the steam boat, and on the railroad until now we are going at a speed which few of us realize. We go so fast that we do not see the flowers by the roadside, the birds in the thickets and the stars in the skies. Much less do we talk about them and other natural things which made up the sum total of primitive man's life.

The nearest approach to primitive man nowadays is found in babies, and boys and girls up to about fourteen years of age. They make a noble fight against it but civilization gradually and finally conquers them and after that they take their places as pawns on life's chess board. Even babies have a hard fight for it. Fond mothers discourage the natural inclination to put its big toe in its mouth by putting as soon as possible those cunning little shoes on its feet. Creeping is discouraged, and paddling with bare feet in the mud-puddle is known of only through children's story books.

Almost the first thing a child does when old enough to hold things in its hands is to make marks with a pencil on paper. We used to use a slate but that is now unhygienic. The primitive child made marks with a stick in the soft mud, in the sand, or in the ashes of the outdoor fireplace. Gradually the marks took form and simple things were drawn; animals, birds, flowers, and tents or houses were roughly outlined. We see our children doing those things today in their play time, but instead of being encouraged this natural bent is all but obliterated in the school and the child is made to do other things thought to be more important. The choice of things is left to people who have forgotten, or never have been permitted to know, what is natural for the child.

We are attempting to do so many things in our schools today, unheard of a generation ago, why not include among them drawing—freehand drawing? True it may not at first commend itself for utilitarian purposes, but we have so much of that. Why bind up our heads to give them form as the Chinese do their feet? We think that barbarous, but is it any more so than to try to make every child's head fit a specified formula, the same as we do a cake? Give us again some of mother's old-fashioned ginger bread which never saw a formula. Today it is made like a laboratory experiment from a formula found in a cook book. And so our schools are being made over on laboratory experiments. Some one gets an idea. It sounds good, let's try it. The school house is fitted up with a special room and special apparatus, and the experiment starts off with a clattering of machinery and a smattering of psychology. These are days of research—research in everything. The place of dogs, rabbits and guinea pigs used in laboratory experiments is taken by children—our own children, in the school experiments. But then our children rarely have the care that we give to a favorite cat or dog; or to some animal, vegetable, or fruit that can be made to command a higher price in the market by being bred properly. In place of the old

juicy pippin of our boyhood we have the dry, mealy Baldwin and the banana apple, both developed species good only for cooking. Who ever heard of a banana apple before twenty years ago?

You may think from the way I state it that I am a pessimist, but I assure you I am not. On the contrary, I am an optimist. The fever which now fills our veins will gradually subside, and eventually we will settle to a state which will be the best for us in the way that we are compelled to live. The idea I want to convey is that we must not lose sight of the things which are natural in us and which, if given but a fair show, will develop and contribute to our own lives and our children's lives, a satisfaction and comfort not dependent on things mechanical.

Most conspicuous among them are the beautiful things in nature which so many are not privileged to enjoy first hand. The unfortunate ones must depend for their knowledge of them on second-hand means—reading and illustration. Note the order—reading and illustration. How much more natural it would be to reverse the order and put it illustration and reading. For the child understands pictures before it does words and can illustrate before it can read. Even grown-ups who are unable to read at all can make some sort of drawings to help their speech. How many among you have tramped the woods with an Indian for a guide and seen him pluck a twig or take a bit of charcoal from the fire, or a piece of rotten stone to make a map of the region through which you are going? An Indian uses few words, but with his rude drawings he can tell a long story. See what we are learning about the ancient Babylonians and Egyptians, and the Incas from the rude drawings they have left behind. They were carved in stone on the mountain side and have not perished. What we leave behind is in books and they will perish.

One only needs to glance through the February number of the National Geographic Magazine to see what these ancient civilizations did in the way of drawing. Indeed, there is more than mere drawing,—there is art in the pictures drawn by our forbears. Colonel Roosevelt in the initial paper of that number of the Geographic Magazine refers to men who "hunted the mammoth and the bison north and south of the Pyrenees, and drew and painted the great beasts on the walls of their home caverns." Our ancestors in western Europe he calls "A race of tall hunter artists . . . they immigrated to western Europe 25 or 30 thousand years ago. They possessed really noteworthy artistic ability, and their carvings, drawings, and paintings of the mammoth, bison, aurochs, rhinoceros, horse, reindeer, cave bear, and cave lion are of high merit."

We of our own day and generation have only to look at the beautiful rugs woven by the nomad tribes of western Asia to see the use made of simple skill in drawing their designs. True there are the beautiful colors of their wonderful dye art, and the soft wools from their mountain sheep. But over them is the master weaver who from his rude drawing in the earth

alongside the loom directs the nimble fingers of the boys and girls who tie the myriads of knots into the figures which make up the *tereh* and the *el-ayassi* (the design and the pattern) of the rug. Here are tribes, indeed a whole people, whose entire commercial relation, practically, with the world outside of their own is the result of a simple knowledge of drawing, coupled with colors taken from the sky, the earth and the bush; everything so simple in conception, yet contributing the most exquisite pleasure to us of the most highly developed and the most complex mechanical civilization.

But let us concede the necessity for things utilitarian in our day and age. Is not drawing—freehand drawing—one of them? The farmer makes a map of his farm and buildings. The blacksmith uses his chalk to mark out on the floor of his shop the thing that he wants to forge. The doctor or surgeon and dentist needs to sketch the instrument he wants for a particular case so that the mechanician can make it. The lawyer needs to illustrate something he is describing in his argument. The engineer needs to sketch out for his draughtsman the thing he wants made. The scientist needs to sketch on paper with one eye what he sees in the microscope with the other. And the good house wife needs to make sketches for the new home she wants to build, the furniture she would put in it, and the landscape features of her yard. All these are utilitarian objects with hardly a thought of art in them. We teach mechanical drawing to go with mechanical training in our schools, so that the man or boy who runs the lathe or planer can cause the machine to produce the thing wanted. Likewise we teach mechanical drawing for the use of the carpenter and builder. But we neglect entirely the far more common need of freehand drawing. Mechanical drawing is for the benefit of a few—for a class. Freehand drawing is for everybody.

And suppose we give to every boy and girl some knowledge of freehand, not *give*—that is not the word—suppose we let them have a chance to develop in themselves skill in drawing. It will, of course, be in various degrees. What may come of it besides things merely utilitarian? Unsuspected ability will come to the surface, will be given a chance to make itself known. A very large number will have developed in them an appreciation of things beautiful. Their interest will be stimulated, and they will be able to analyze and classify as to merit the things represented to them as Art. If nothing more were accomplished than that, something to enable them to make our homes more beautiful, it would be worth while. Who would dare to predict that by the cultivation of something in every boy and girl that is God given, the effect on us as a people, the development of our life, might not take on an entirely different character. Why not recognize the existence of this elementary love of art in the heart of everyone? It is seen in the old chromo hanging on the walls of the humblest homes, in the pictures clipped from illustrated periodicals and calendars and stored for safe keeping between the leaves of the old family Bible. Everywhere, all about us, on the fences and bill boards, in the street cars, the advertiser uses his art to appeal

to the elemental in us. He makes pictures do the work of words. So in the comic supplements of our Sunday newspapers, rude stories are written in pictures. Yet with all this evidence of its universality, here in Michigan almost no attention is given to the subject of freehand drawing. If only the bonds were unloosened you would find in the hearts of the humblest among us a germ which if cultivated would make unnecessary any special pleas for art in the schools.

Among the thousands taking freehand drawing there would be the chance of finding a boy or girl of exceptional skill, and at a time of life when that skill could be developed. Think of finding a Franz Hal, a Whistler or a Randolf Rogers, not once in a century or two, but every little while, with an occasional crop of them. They grow wherever the conditions are suitable, often in spite of conditions. Let us give them a better chance in Michigan.

My plea for freehand in our primary and secondary schools has then more than the mere utilitarian idea behind it. It has what every boy and girl has a right to expect and to demand, namely a chance to develop any natural artistic bent God may have given them to the end that they may make of themselves the utmost possible in this hard grinding world of ours.

Give us freehand drawing in our common schools not as a luxury, but as a necessity, and for the opportunity it affords to widen the scope of the activities of our boys and girls in life.

ART IN HARNESS.

JAMES PARTON HANEY, DIRECTOR OF ART, HIGH SCHOOLS
NEW YORK CITY.

Dr. Haney preceded his paper by reading his "miracle play," entitled "The Stranger." This he followed by an address on the practical relation of art to industry. This address he illustrated with a large number of lantern slides showing the methods of teaching used in foreign industrial art schools. Most of his remarks were in explanation of these pictures. A complete transcript of his paper cannot therefore be given. What follows is an abstract of his introduction and his closing arguments in favor of the development of industrial art education in our country.—EDITOR.

I have been asked to talk about industrial art. I wish to talk about it without sentiment, and to keep my feet on the ground, while I contrast that which is done on the other side of the ocean with that still to be done in our own land. We are behind in the training of artist artisans. We are

behind to an extent which is going to cost this country much in the years to come. I do not ask you to take my words in proof of this. I ask you to take my facts and consider them yourselves. May I add, parenthetically, that while I shall commend various features of foreign industrial art training, I do not stand as a special pleader for any one form—French, German, or English. I shall tell you about these foreign art schools and about the ideas of the men who run them. Of what value are the suggestions, you shall judge.

The other day there came to my desk a volume made by students. It came from a single class in the art school of Leicester, England. This class was one in lithography, and every page in the book had been designed, drawn, put on the stone and through the press by an individual student. These pages were beautiful and noteworthy examples of lithography. Yet this work was only a small part of that done in one little known industrial art school in England. When, however, one sees how thorough is this preparation, one sees the first and basal principle of these schools. This principle looks to see each student so prepared in his speciality that he may successfully practice it in the industrial world.

The idea that we are able in this country to develop our educational system by ourselves, and without reference to educational systems elsewhere, is an error. How grave this error is, in industrial education, one can scarcely realize until one comes to study in detail the industrial preparedness of our foreign competitors. Art education in these schools is of serious concern to the state. It is regarded, economically, as one of the most important things that the state can be interested in, for on every hand it touches industry.

I have been in towns which were filled with steel works; there was an industrial art school for these workers. I have been in towns which were filled with silk factories; there was an industrial art school for silk factories; there was an industrial art school for silk workers. So one may find pottery schools, lace workers' schools, etc., in villages, and schools offering art training in half a dozen industries in larger towns. It is virtually a fact that every Continental city of any importance has an industrial art school of its own, supported in part by city and in part by the state. In these schools they have splendid equipments, but from our point of view, ridiculously small classes.

In one of these schools—"Somewhere in France," or "Somewhere in Germany,"—I visited an industrial art school which was directed by a personal friend. He took me through the various classes, some with twenty students, some with fifteen, until we came at last to an advanced architectural class. Here we saw a well-paid professor, who was teaching day and evening. He had a studio of his own next to the big studio of the school, and pursued his own profession at the same time that he gave criticism in

the school, but his class when seen only numbered three. I shaped very carefully a question and put it to the director.

"Sir," said I, "although this class is not large, I nevertheless assume that you consider the course a success?" My friend understood well enough what was in my mind. He turned and looked me in the eye and said: "My dear sir, the men who can do this advanced type of architectural design are very few. If we only had one man, we should offer this course to him, for who knows what that man might do for the architecture of our country." You can draw from this answer some idea as to what is the chief motive behind this training of the talented worker. It is that he shall be trained to the point where he can work with the greatest efficiency, not merely for his sake, but for the sake of the state, which, too, profits by his skill.

In this country we have a number of arts and crafts societies. For the most part these are not very influential or far-reaching. Abroad there may be seen associations of the foremost workers with great business organizations behind them. Their establishments are to be found in all the large cities, with rooms beautifully fitted up for the exhibition of contributors' works. Artists of note are back of these associations and are delighted to sign their contributions. Hence, one finds single pieces of furniture, or whole rooms, designed by men famous in the art world. These men, trained by the state, are proud to lend their talent to the development of the industrial arts. Thus the state draws interest on its investment.

The United States has few industrial schools. One can number these, supported by state or city funds, on the fingers of two hands. Our national shortcoming in this report is amazing. When my friends abroad had shown me their schools, they turned and said: "Now tell us about your great New York school." I said: "I am very sorry; we have none." They said: "We know the American habit of making fun. You are joking. Tell about your great New York art school." I said: "I am very sorry; but we have none." They would not believe it! They could not believe that a city of five million inhabitants, one of the greatest manufacturing cities in the world, had not self-interest and public spirit enough to sift out its talented workers and use them for the benefit of city and state. To them it was inconceivable, because contrary to their ideas of academic common sense.

I failed in another particular to convince my foreign friends. This happened when I tried to translate the phrase which reads in English, as follows: "There are many in America who think that the teaching of drawing is a frill." Can you translate that into French? Can you translate that into German I found it very difficult. The reason was because my hearers had not the condition of mind which enables one to make the translation. If you wish to say a thing is "a frill" in education, you must have for hearer, a man who understands what you mean by thinking lightly of the subject. If he had been trained from boyhood, to look at industrial art education as one of the things which is most profitable to the state to develop, to make

him understand that there is a great industrial people who look upon it as a frill, is to try to make an idea plain which is quite foreign to his thinking. My friends abroad listened with amazement, and were incredulous when I left them.

Permit me to draw for you a picture of a typical industrial art school—one of the great group of schools which spot the map of Europe in the pattern of the cities. You must fancy a good-sized building with a score of large studios for the students and nearly as many more smaller ones for the artist teachers. There will also be an auditorium, or meeting hall, for public lectures, and an exhibition gallery in which choice specimens of the students' work are to be shown.

Great numbers of students we shall not see, for the classes are never very large. Twenty or twenty-five students may at most be found in the entering sections, but as one follows these groups through the school into the higher grades, one finds their numbers growing smaller. Some have gone to work, some have not been able to keep the pace. The school, however, makes every effort to retain throughout the course those whose work indicate them to be of unusual talent.

Fees are asked of all entering students, though these for local pupils are never high. The boy of talent, who cannot pay these moderate charges, sees them reduced, or cut in half. If he still cannot afford to pay them, they are waived altogether and he is accepted free. If even then, he cannot remain in the school, and yet shows by this work that he is full of promise, the school pays him to attend! We call such payments "scholarships," they call them "stipenda"; but by either name, they mean only one thing: that the school, or rather the state, which is behind the school, regards it as more to its interest to see that the students with special gift or talent stays in the school, than that he be allowed to leave without that talent being perfected to a point where it will be a matter of profit to the state. Again the question is regarded as an economic one in which the welfare of the state is best served by the training of the worker to the point of greatest efficiency.

I had occasion, not long ago, to visit a manufacturer of fine furniture in New York City. Said he, as he took me through his workshop: "I am very much concerned." I asked him, "Why?" and he replied, "My best workmen are growing old. In a few short years these men you see here will no longer be able to work, and I know not where men are to be obtained to replace them." "Why not," said I, "secure your workers from the same source whence you obtained these?" "Alas," said he, "that is impossible. Each of these men was trained in a foreign industrial art school. They are all expert workmen who had years of schooling before their years of practice in the trade. We have sought in vain to secure native talent with anything like this careful training. The lads who apply to us for positions lack, woefully, any technical knowledge, and there is no school to which they can go which will train them in the higher branches of this work. As you know,

the apprenticeship system has virtually disappeared and we are in no position to train them ourselves, so what we are to do I do not know."

This, gentlemen, is not an overdrawn picture of what is to be seen in many factories throughout our country. Consciously, or unconsciously, we have, for many years, been using talent trained in foreign industrial art schools in the development of our own industries. Not a few men who have been state-trained abroad, have been employed by us to our advantage. But now there flares on the other side of the water a conflagration which has not only consumed some of the best blood trained in the schools of the warring nations, but has shut many of these institutions and will leave them, for many years, at a disadvantage in meeting the needs of their own communities, let alone supplying us with expert workers.

We are surely shortsighted if we fail to realize how important this question is soon to become. The economic questions involved in the war, will not be settled by any "Peace Convention," for deep lying among the causes of this international quarrel, is the question as to who shall control the channels of trade, who shall govern the markets, who shall, in economic sense, "have a place in the sun?" Peace may come on border lines, but the economic war for markets keeps on, and in this war the skilled designer plays a major part. It is a war fought by the man behind the pencil rather than the man behind the gun. The question with us is not only the training of an army of defense, which shall, by its skill, offer goods which shall be first choice in our home markets, but the training of an army of offense, which can produce goods so well-designed and made, that world markets, other than our own, will become ours by virtue of the attractiveness of our product.

I have recently been in Detroit. As you know, automobiles, not a few, are made there. In my conversation with Detroiters, I found an inevitable tendency of the native to talk "stream-line" to me. He talked in automobile terms, but I was much interested to note that these terms were very largely the terms of design. The enthusiast talked about the beauty of this car, or of that. He advanced, with spirit, what advertisers call "choice talking points." In other words, he used his knowledge of practical aesthetics to show me in what way the product made in his town was well worth having. This is art in business. It is art founded on the fundamental principles of design. It is art that speaks of fine line and fine form, but speaks of these in no sentimental fashion, but with appreciation of what advantage good design is in a business way.

Every manufacturer, or man who handles a manufactured product, should understand that art plays a definite part both in the construction and in the sale of that product. It appears in the design and color of the goods themselves, in the cartons in which they are packed, in the boxes which hold the cartons, and the labels on the boxes; in the printed circulars which advertise the goods, in the merchant's window in which they are displayed.

The man who knows how to buy advertising, good in design and color, how to devise well-printed matter, how to pack goods attractively and to show them in a window so that they will draw trade, that man, by virtue of his practical knowledge of art, is bringing dollars to himself and reputation to his town and state.

In the schools of every city in our land are children with latent talents of varied kinds. Some are to be good musicians. Some to be skilled in the art of writing. For some, numbers are to be as play and some shall speak with the gift of tongues. But there is also one group, one, two, or three hundred strong, who have talent in their fingers, the skill of the master of design, which might make precious countless millions of manufactured forms. It is to the interest of that city to see that these boys and girls do not escape from the school with this talent wrapped as in a napkin, with this gift left to shrink and wither like a flower unwatered and unsunned.

A few days since, the president of our country addressed city after city in a plea for "preparedness." This, also, is my plea. I have tried to show that the war which is now being waged abroad has fundamentally connected with it economic questions which concern us deeply. This country should prepare itself for what must come after the war. When protocols are made, when peace is finally declared, when the guns are silent, and the armies disbanded, the economic war for the markets of the world will go on still. In such a war, where nation strives with nation, through mills and shops, and every artery of trade—in such a war—there is no peace!

THE PURPOSE OF ART INSTRUCTION IN AMERICAN EDUCATION.

ROYAL B. FARNUM, STATE SPECIALIST IN ART EDUCATION, ALBANY, N. Y.

It is true that all people may be separated into two classes, Producers on the one hand, and Consumers on the other. It is also true that education seeks to raise the standard of these classes, that is, create greater producers and more intelligent consumers. Art in education is only one among other subjects contributing to the advancement of this general purpose. It is my privilege to point out the importance of art in education and to determine its relative value in the educational platform.

In particular the purpose of art instruction appears to be four-fold. First, to offer encouragement, guidance and support to the art leader. Its privilege is first to discover him and then help him. Second, to help promote the conscious development of beauty in the industrial product. Its opportunity lies in its contribution to preparedness for peace. Third, to train the individual to see and to express. Its problem here is visualization and the training of the senses. Fourth, to develop a true sense of the appreciation of Beauty. Its task is fulfilled only as it trains for beauty in living.

In the little hamlet of Gruchy, a few miles west of Cherbourg, there had lived under the same roof, three generations of peasant farmers, intelligent, but poor. In the early part of the 19th century the eldest boy was beginning to assume responsible cares, with no other prospect than the life of his father and grandfather before him, when one day the sight of some old woodcuts in a bible lead him to take up his pencil during the noon hours, while the others were resting. Then followed sketches of the geese and the sheep on the farm, the fields and the garden, until finally his wise and discerning father recognized a special ability in the boy. They were poor and the boy was needed but as soon as the brothers grew stronger the father said that Jean should go to Cherbourg and learn the trade of painting, for folks said it was such a fine thing. So together they journeyed to Cherbourg where the art master impatiently questioned why they had not come before.

Thus began the career of the great Millet, but before two months were gone the father died and the young artist regretfully decided to give up his work and manage the farm. Again a person of keen insight and intuition interfered. "Not so," said his good grandmother, "My François, you must accept the will of God. Your father said you were to be a painter, obey him and go back to Cherbourg." So at last the great painter started his work, encouraged first by his family, next by his teacher and lastly by the Town Council which voted him a pension of 600 francs, later increased to 1,000 francs, to complete his studies in Paris.

Millet brought wealth to his country, fame to his profession and love in all hearts for France.

Today it is the privilege of art education in America to perform a like service, offering sympathy, instruction and support to her leaders.

New York State now offers many Regents Counts without examination for special art courses in high schools, vocational courses are offered in the New York City Washington Irving High School and that same city has established the evening Industrial Art School. But much more must be done and states should follow Massachusetts' example with compulsory art education, that the leaders may be chosen, and a professional art school that they may receive advanced training at the expense of the commonwealth.

This, then, is the first purpose of art instruction in American Education, to offer encouragement, guidance and support to the art leader.

If you visit the average home of taste in this country you are struck forcibly by two things, first, the appearance of many objects of foreign make and second, the grotesque ugliness of others. The reason for the first is not questioned for you instinctively recognize the inherent qualities of beauty for which they were bought. The reason for the second is overlooked because you feel you cannot help it. They are American, produced in quantity by roaring machinery in record time, and sold at bargain prices. You feel at once the Americanism in the product, the desire for quick returns. For a false ideal which is too often quoted as the American ideal, makes these demands. Rush, high speed, big deals, huge buildings, colossal trade, profits in millions and "beat the other fellow to it" have given us an unenviable reputation. They have likewise demanded a speeding up process all along the line until "Efficiency Engineering" is today a leading profession.

But by great good fortune and a wise Providence expertness and the conditions necessary for modern hustle demand the refinements of art—of beauty. Yet because of blindness and the fact that men are "too busy" beauty has come upon us unheralded and unnoticed and the man is as heedless of the art of his telephone as he is ignorant of the nervous effect of the color of his office. Nevertheless as efficiency has increased there has been a corresponding increase in the quality of beauty in the product of industry.

One or two examples will suffice. The American ax is said to be a work of art "because it is eminently fit for its purpose." It is an example of perfect utility, a fact unquestioned, but it has a beauty unrecognized. The American is perhaps the greatest athletic and the most expert forester in the world. From the time the Puritan built his first fire on the shores of New England to the present day he has been hewing his path and place in the United States by his ax. From a straight stick and a sharpened iron head the ax has been gradually refined until today its graceful handle, its rounded blade and its well balanced head are beautiful in the extreme. Every curve is the result of careful and thoughtful experimentation, of acci-

dent and of use, and there is no line which does not have its particular part to play in making it serve its purpose.

Or consider the automobile, at first the "horseless carriage"—and that is exactly what it was, an ordinary horse vehicle without the horse. Now that carriage, which is still in use, acquired its size and shape for reasons of its own. It must be high enough from the ground so that the horse will not obstruct the view, the wheels are large because they make for easier travelling, the front wheel is often smaller than the rear so as not to interfere with the person who climbs in and out, the width of the carriage is largely determined by the size of the human occupant. These and other practical reasons have developed and created the carriage as we find it today and its grace of line and beauty of proprtion when seen attached to its propelling power, the horse, are apparent.

An engine, small enough and powerful enough to propel the carriage was invented, and installed. The result, in the light of our present automobile designs was ludicrous. Then changes appeared. There was now no need of the customary height, of the big wheels and of two sizes. The engine at first placed in the space for baggage, in the rear, was brought to the front, the dasher became the wind shield. Possibilities of increased speed brought other changes. Wind obstructions disappeared, vertical lines were reduced and horizontal lines lengthened until today the motor car, so powerful and so efficient, is again an example of beauty, literally a work of art.

One might continue to enumerate such examples, the automobile engine, the locomotive, the electric car, the typewriter, the telephone, the printing press, and so on and on, without reaching the end of the number of man's achievements which, by reason of the demand for speed, quantity, power, etc., have developed into objects whose esthetic proportions have been increasingly refined. But man has had no time and no inclination to give heed to it, and perhaps there has been little reason for it for progress has been unhampered by questions of art up to the present century. At any rate the truth remains that getting and not giving, that quantity and not quality, that bullion and not beauty have commanded the attention of the American.

Just as he has been blind to the beauty of his machine so he has been undismayed by the ugliness of his machine product. But is it safe to predict that the United States is at her third and last great turning point? Let us hope it is true. We read that every new country goes through three stages of economic development. First, by reason of its weakness in infancy it imports and depends upon its sustenance from outside sources. Second, it exports, but only its raw materials which it has been developing. It continues to import the same things with this difference, that they are now manufactured from the country's own exported raw material. In other words the raw material sold is purchased back in a perfected state. Third, it ex-

ports but now it is a surplus of the things it once imported for its enlarged plants have become manufacturers of its own raw material.

Unquestionably this country is ready for the third stage. The great war has forced our eyes open to that fact. Foreign trade is ours for the taking, and we are beginning to take our share, at least. This demands manufacture, which we are in a position to produce. And now comes the vital point to all this. In order to compete with the foreign market in manufacture we must recognize what France, England, Germany, Italy and Japan have long since recognized, that the art character in the product is the final quality to be obtained in the industrial output. Personality, brains, beauty, plus utility, are the elements essential for a high money value and for permanently successful sales. These are the elements which underly all the great productions of the world. The pottery of the Greeks, the glass of the Venetians, the iron of Nuremberg, the crafts of the Middle Ages found a ready market and are more than ever beautiful today because the worker put art in his work. Our machines are gaining this quality in spite of our blindness but their products are woefully lacking. Our cut glass, stamped chair backs, gaudy wall papers, glaring lights, crude joke papers, and hundreds of imitation products do not make for industrial progress. Good art is more apt to be found in the expensive which is invariably foreign. "When beauty is used to enhance the attractiveness of the inexpensive as it now exalts that of the costly" we may hope to compete in the world market.

This is the second purpose of art instruction in American education, to help promote the conscious development of beauty in the industrial product.

That old expression, "I see! says the blind man," brings no message to many a person with two good eyes. You have all heard of the two men, one of whom could not see the forest because of the trees, the other of whom could not see the trees because of the forest. The one who can not see is no less fortunate than the one who cannot think and both are matched only by the one who cannot express. Seeing, thinking and expressing are absolutely essential in the development of modern civilization. Without this power a man way as well give up at the start.

All achievements, great or small are the result of these three powers. The greater the achievement, the more highly developed are the seeing, thinking and expressing abilities of the individual. A man sees something; he notes its limitations, its possibilities; he thinks of his own needs; his visualization, his mental analysis and his criticism develop new deas and he finally gives expression to them, so we have the telephone, the sewing machine, the reaper, the Brooklyn bridge, the gasoline engine, the Panama Canal, the aeroplanes and innumerable other expressions.

Most trades and many professions demand these. Mr. Frederick W. Hamilton in his recent address at the school of printing, North End Union, Boston, on "The Apprentice and his Training" said, "The development of

these powers and characteristics is the essential which we must always hold in mind in trade training."

But the senses dependent upon this training receive too little attention. "For," claims ex-President Eliot, "school training consists altogether too largely of a study of the memory subjects." The eyes, the ears, and the hands have been woefully neglected. The handling and manipulation of real things has been untaught. Immediate changes are needed and "the changes," says this leading educator, "which ought to be made immediately in the programs of American secondary schools, in order to correct the glaring deficiencies of the present programs, are chiefly: the introduction of more hand, ear, and eye work—such as drawing, carpentry, turning, music, sewing, and cooking, and the giving of much more time to the sciences of observation. Although considerable improvements have been recently made in the programs of American secondary schools, especially within the past ten years or since vocational training has been much discussed, multitudes of Americans continue to regard the sense-training subjects as fads and superfluities.

They say the public elementary schools should teach thoroughly reading, writing, spelling, and arithmetic, and let natural science, drawing, music, domestic arts and crafts, and manual training severely alone. Let the secondary schools teach thoroughly English, Latin, American History and mathematics, with a dash of economics and civics, and cease to incumber their programs with bits of the new sciences and the new sociology. This doctrine is dangerously conservative; for it would restrict the rising generations to memory studies, and give them no real acquaintance with the sciences and arts which within a hundred years have revolutionized all the industries of the white race, modified profundly all the political and ethical conceptions of the freedom-loving peoples, and added wonderfully to the productive capacity of Europe and America."

This is the third purpose of art instruction in American Education, to train the individual to see and to express.

When one contemplates the curriculum of the modern public high school with 4 years of English, with 4 years of History, with 3 and 4 years of French and German, with 2 and 3 years of mathematics, with physics, chemistry, astronomy and biology, with Latin and Greek, with physiology, civics, elocution and many other subjects, it is small wonder that art finds blinded eyes and deafened ears. And yet, contemplation and analysis reveals the amazing fact that not one of these subjects trains the child in the business of beautiful living.

He may read or speak in four different languages, he may know algebraic equations and geometric constructions, he may recognize the laws of force and combustion, he may read the stars and name the bones of the human body, he may know syntax and a hexameter or an atom and a root verb but he is lamentably unfit for true living. When he leaves the school

he doesn't know what to buy but lets the clerk sell him something, "just as good"; he is confronted on the street by glaring bill-boards but doesn't know why they offend; he submits to the ignorant house painter for he doesn't know how to do otherwise; he accepts poor jobs from his printer but doesn't know how to correct them; his rooms, his furniture, his pictures, his lights, do not satisfy and he has no remedy; his street and his city are ugly but he is incapable of discerning the reason. In fact his living and the real vital things with which he comes in contact have had no place in his schooling. His school ratings may have brought him high credit but in the daily problems he meets he scores repeated failures. He has no sense of the appreciation of Beauty, and its real meaning. There has been too little demand for it, for the average American has been so busy developing the raw product that he has had no reason for studying its refinements, and because of the abundant and easily procured materials of wealth, because of our high standards of living and because of our high pressure of business we now find surplus energy and surplus emotions but no early training that their proper exercise may bring us lasting and probitable pleasure.

"Man," says Caffin, "was born to the work habit, he is acquiring the play habit but he has slight leanings toward the art habit." Life is measured by its thrills. Man takes pleasure in a day's work well done, he delights in a game well played but as yet he fails to appreciate the art of the genus, a pleasure which can easily give the greatest, the deepest, and the most lasting joy of them all.

The time is at hand, however, when the demand for beauty and a training in the lessons of art is becoming more and more insistant. A little reflection quickly discovers this,much to the amazement of the average person.

There has never been such a world wide demand for beautiful printing. Handsome type, good proportion, fine spacing, simple ornament, pleasing illustration and delightful color are only a few of the qualities which are insisted upon by the public.

There has never been such a wholesale demand for beauty in commercial business. Office stationery, office equipment, and office furnishings are considered as seriously by the commercial leader as his market.

There has never been such a demand for civic beauty. Good roads, beautiful parks, restricted buildings, and handsome street furnishings are but a few of the things now considered important for a city's development.

There has never been such a demand for beauty in home decoration. The architecture, landscape gardening, color schemes and interior furnishings are considered as carefully as questions of heating, taxes, and upkeep. Today the market is literally flooded with magazine sections and books on the subject, for the demand is persistent.

There never has been such an intelligent and so serious a demand for real beauty in costume. Proportion, relative widths of trimmings, decora-

tions, color complexions, and the figure are actually beginning to hold their own with style.

These are but a few of the signs which point to an urgent demand for adequate art training in the public schools; for intelligent training in the elements of beauty. The public is insisting that things be less ugly and the only possible force to combat it is beauty. Our aim must be not only to develop appreciation to the extent that pupils will like and enjoy the finer things but that they will be brought to a point where they will, when grown, control and prevent the production of poor things. The first is easy, the other is more difficult yet it simply means that the first must make its lasting impression.

This is the fourth purpose of art instruction in American education, to develop a true sense of the appreciation of Beauty.

Art education in America must produce the art leader, it must beautify the industrial product, it must train the individual to see and to express, and it must develop in every pupil a true sense of the appreciation of beauty—for

"There is not anything the soul more craves than beauty.
It exalts the merest line
That through the every-day experience waves,
Seeks blindly the divine.

For what in very truth is this we crave
That neither loads the board nor fills the purse,
But wanting which the earth were but a grave
And life itself a curse.

The visual presence of a living God
That permeates creation comes and goes
In substance and in shadow, greens the sod
And tints and paints the rose,

And flows through man into his works of art,
The painting's glow, the statues breathing gleam,
For not a touch of beauty stirs the soul
But comes of the supreme."

—LEIGHTON.

Status of Superintendents, Principals and Teachers of the High Schools of Michigan

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INTRODUCTION.

This study aims to give in concise form a few general facts concerning the superintendents, principals, teachers, and pupils of all the public legal high schools of Michigan as obtaining November 1st, 1915. The necessary data have been secured through a questionnaire sent to the superintendents or the principals of all the high schools of the state coming within the scope of the School Act of 1913*—a total of 318.

The response to the questionnaire has been most extraordinary. Replies have been received from every public legal high school in the state, and from a few schools which are not high schools within the meaning of the law. This hearty co-operative spirit merits highest recognition.

Every effort has been made to secure accuracy. Many reports have been returned for further information, a number have been corrected through correspondence, while others have been interpreted through the records of the North Central Association and the Inspector of High Schools. A few items bearing on length of service and salaries of teachers have been omitted but they are not sufficient in number to effect the general distribution.

CLASSIFICATION.

For purposes of closer analysis the high schools are divided into three distinct groups:

1. Schools accredited by the North Central Association.
2. Other Accredited Schools.
3. Non-Accredited Schools.

The schools accredited by the North Central Association are honor schools. They have a teaching force of not fewer than four teachers of academic subjects exclusive of the superintendent. The new teachers employed possess bachelor's degrees from standard colleges or universities, or possess academic attainments equivalent to four years of training beyond the high school. The standards of instruction, the intellectual and moral tone

* The Michigan Legislature of 1913 enacted a law defining a high school as follows: "A high school shall be a graded school maintaining twelve grades of work with at least two teachers devoting their entire time to the ninth, tenth, eleventh, and twelfth grades."

of the pupils, the library and laboratory facilities, the location, construction, sanitation and equipment of the school buildings, are high grade, wholesome and satisfactory. Students graduating with distinction are admitted without examination into all the colleges and universities of this country with few exceptions.

The other Accredited Schools have a teaching force of not fewer than three teachers including the superintendent. No specific degrees or scholastic attainments are required. The character of instruction, the moral standards of the pupils, the library, laboratory and general equipment, as well as the construction and sanitation of the buildings, are reasonably satisfactory. Students graduating from this class of schools with acceptable credits are admitted without examination to the University, and to the other higher institutions of the state, if recommended by the proper school auhorities.

The Non-Accredited Schools offer four years of study but are deficient in number of teachers, in character of instruction, in buildings or in equipment. Many of them are new and undeveloped. Students graduating from this class are not admitted to the University except on examination.

METHOD OF TREATMENT.

The data collected are presented in the form of tables with such interpretations and comments as seem necessary to emphasize important facts and tendencies.

TABLE I.

Showing the enrollment of the pupils of the various groups by grades.

Grades	9	10	11	12	Specials	Total
North Central Schools	13668	9355	6957	5733	560	36273
Other Accredited Schools	5490	3642	2880	2311	195	14518
Non-Accredited Schools	1699	1080	947	703	41	4470
Total	20857	14177	10784	8747	796	55361
Percentage of Enrollment	38	26	19	16	1	100

Comments on Toble I.

1. There are 55361 pupils enrolled in the public legal high schools of Michigan. Of this number 36273, or 66%, are in the North Central group; 14518, or 26% in the Other Accredited group; and 4470, or 8%, in the Non-Accredited group.

2. The rapid elimination of pupils, as shown by the decreasing percentages in the various grades, indicates in a forceful way the tremendous social maladjustment and consequent educational waste in our public high school system.

3. A comparison of elimination in the North Central group with that in the Other Accredited group shows that there is close correlation between them, the curves being practically parallel. This indicates that the social maladjustment of each group is due to the same causes, or that the presumably closer social adjustment of the North Central group is counter-balanced by the greater opportunity and inducements offered pupils pursuing special courses for entering commercial and industrial life before completing the school.

4. The correlation between the above groups and the Non-Accredited group is slight. The curve of the Non-Accredited group begins higher than either of the other groups, falls to a much lower point in the tenth grade, and then rises higher in the eleventh and twelfth grades. The sudden drop in the curve in the tenth grade signifies marked maladjustment or unsatisfactory instruction. The rise in the eleventh and twelfth grades is doubtless due to the influx of pupils from the rural districts.

TABLE II.

Showing the number of public legal high schools, and the number of superintendents, principals, and teachers of such high schools—men and women.

	No. of Schools	Superintendents		Principals		Teachers		Totals		%		Grand Total
		Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	
North Central Schools...	95	90	0	77	17	566	1111	733	1129	39	61	1862
Other Accredited Schools.	146	146	0	57	88	123	347	326	435	43	57	761
Non-Accredited Schools..	77	75	2	*0	*0	18	125	93	127	42	58	220
Total	318	311	2	134	106	707	1583	1152	1691	41	59	2843

Comments on Table II.

1. Michigan communities do not approve of women as superintendents of schools, but do approve of them as principals of high schools.

2. The number of men teachers employed in the high schools of Michigan is much larger than generally estimated. They are distributed among the three groups with striking uniformity.

3. The number of teachers in the different groups correlates precisely with the number of pupils in the same groups—66%, 26%, and 8% re-

* The office of superintendent and principal is not differentiated in this group.

spectively, or a ratio of 20 pupils per teacher. This indicates that the number of pupils per teacher, whether in large high schools or small high schools, has become thoroughly standardized in this state.

TABLE III.

Showing the size of high school faculties including superintendents and principals.

No. of Teachers	North Central	Other Accredited	Non-Accredited	Total
Two teachers	0	0	32	32
Three teachers	0	23	33	56
Four teachers	0	54	9	63
Five teachers	0	35	2	37
Six teachers	2	16	0	18
Seven teachers	4	6	1	11
Eight teachers	6	2	0	8
Nine teachers	10	4	0	14
Ten to fifteen	34	5	0	39
Fifteen to twenty	13	0	0	13
Twenty to twenty-five	5	0	0	5
Twenty-five to thirty	9	0	0	9
Thirty to forty	6	0	0	6
Forty to fifty	1	0	0	1
Fifty to seventy-five	4	1	0	5
Seventy-five to one hundred	0	0	0	0
One hundred to one hundred and twenty-five	1	0	0	1
Total	95	146	77	318

Comments on Table III.

1. There are no schools in the North Central group which have less than five teachers including the superintendent and principal.

2. In the Other Accredited group 77% of the schools have five teachers or less including the superintendent and principal.

3. In the Non-Accredited group 86% of the schools have three teachers or less including the superintendent and principal.

4. Of the 318 public legal high schools 188, or 59%, have five teachers or less including the superintendent and principal.

TABLE IV.

Showing the academic training of superintendents, principals and teachers in public high schools accredited by the North Central Association.

Higher Institutions	Superintendents								Principals							
	No. Holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total
University of Michigan	..	12	29	..	..	13	..	54	..	12	36	..	..	14	..	62
Michigan State Normal College	..	..	..	7	20	..	..	27	..	..	..	..	17	2	..	19
Central State Normal School	..	..	..	..	6	..	..	6	..	..	..	..	2	1	..	3
Western State Normal School	..	..	..	..	2	..	..	2	..	..	..	..	1	2	..	3
Northern State Normal School	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Michigan Agricultural College	..	..	2	..	..	..	..	2	..	..	..	..	..	1	..	1
Michigan College of Mines	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Adrian College	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1
Albion College	..	..	6	..	..	2	..	8	..	..	7	..	..	1	..	8
Alma College	..	..	3	..	..	2	..	5	..	..	3	..	..	1	..	4
Ferris Institute	..	..	..	..	..	1	..	1	..	..	..	..	..	1	..	1
Hillsdale College	..	..	1	..	..	1	..	2	..	1	4	..	..	1	..	6
Hope College	..	..	2	..	..	..	..	2	..	..	1	..	..	..	..	1
Kalamazoo College	..	..	1	..	..	1	..	2	..	..	3	..	..	1	..	4
Olivet College	..	2	..	..	..	..	..	2	..	..	6	..	..	1	..	7
Special Schools in Michigan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Special Schools in U.S. outside of Mich.	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Normal Schs. in U. S. outside of Mich.	..	..	..	..	3	..	..	3	..	..	..	..	2	1	..	3
Colleges and Universities in U. S. outside of Michigan	1	8	20	..	..	24	..	53	1	4	17	..	..	17	..	39
Colleges and Univ's in foreign countries	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..
No. not attending any higher institut'ns	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Totals	1	22	65	7	31	44	0	170	1	17	78	0	22	46	0	164

Higher Institutions	Teachers (Academic and Vocational Subjects)								Summary	Distribution of Teachers of Vocational Subjects						
	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	General total of Sup'ts, Prins., Teachers (Academic and Vocational)	No. in Manual Training	No. in Domestic Science	No. in Commercial Branches	No. in Music	No. in Art	No. in Physical Education	Total
University of Michigan	..	68	561	..	..	87	..	716	832	8	..	10	4	1	5	28
Michigan State Normal College	..	..	2	40	149	47	..	238	274	15	17	27	12	8	7	86
Central State Normal School	..	..	..	..	30	..	..	30	39	2	..	2	3	3	1	11
Western State Normal School	..	..	..	..	36	3	..	39	44	14	4	1	3	3	..	25
Northern State Normal School	..	..	..	..	9	3	..	12	13	3	5	..	..	..	..	8
Michigan Agricultural College	..	..	64	..	..	16	..	80	83	6	20	..	..	..	1	27
Michigan College of Mines	..	..	2	..	..	..	..	2	2	1	..	..	..	..	..	1
Adrian College	..	1	10	..	..	4	..	15	16	..	..	1	1	1	..	3
Albion College	..	1	48	..	..	14	..	63	79	..	..	8	2	1	..	11
Alma College	..	..	21	..	..	..	..	21	30	..	..	..	..	..	..	..
Ferris Institute	..	..	..	..	..	34	..	34	36	..	..	22	3	..	..	25
Hillsdale College	..	..	20	..	..	6	..	26	34	..	..	6	..	..	..	6
Hope College	..	..	5	..	..	2	..	7	10	..	..	..	..	..	..	..
Kalamazoo College	..	2	28	..	..	5	..	35	41	..	..	..	..	..	..	..
Olivet College	..	..	68	..	..	7	..	75	84	..	..	..	1	1	..	2
Special Schools in Michigan	..	..	..	..	..	34	..	34	34	4	9	20	9	..	..	42
Special Schools in U.S. outside of Mich.	..	..	1	..	2	86	..	89	90	8	14	4	5	14	12	57
Normal Schs. in U. S. outside of Mich.	..	..	2	..	30	7	..	39	45	7	8	2	..	2	1	20
Colleges and Universities in U. S. outside of Michigan	1	25	222	..	..	162	..	410	502	10	12	6	4	5	3	40
Colleges and Univ's in foreign countries	1	1	5	..	..	5	..	12	13	1	..	..	..	..	..	1
No. not attending any higher institut'ns	..	..	..	..	..	..	21	21	21	..	..	..	1	1	..	2
Totals	2	98	1059	40	256	522	21	1998	2311	79	89	109	48	40	30	395

Comments on Table IV.

1. There are 88 superintendents of the North Central group who possess bachelor's degree, or better, from standard four-year colleges. On the face of the returns, therefore, there are but two who have less than bachelor's degrees. This number, however, is only approximately true as several superintendents have taken degrees at more than one institution and hence are enumerated twice. The general distribution is 170, or 89%, showing how strikingly large a number have studied for longer or shorter periods at two or more higher institutions.

An examination of the individual reports makes it clear that in some cases this cosmopolitanism has been of positive gain, while in many cases it has led to dissipation of energy, to loss of time, and to much consequent waste.

2. There are 94 high schools in the North Central group, and Table III shows that there are 96 principals reported as possessing bachelor's degrees, or better, from standard four-year colleges. As in the case of the superintendents, a few principals have received degrees from more than one standard college or university and hence are enumerated accordingly. The general distribution is 164, or 74%.

3. The number of high school teachers in this group, exclusive of superintendents and principals, is 1677. Of this number 1159, or 69%, possess bachelor's degrees, or better, from standard four-year colleges. The teachers who do not possess such degrees are, for the most part, those who possess the "equivalent" to such degrees, or who are teaching vocational subjects, or who were occupying their present positions at the time the school was first accredited by the North Central Association. The general distribution is 1977, or 18%, a marked contrast when compared with that of the superintendents or the principals.

The North Central Association has never exacted college degrees of teachers as a prerequisite to the admission of a school to its accredited list, but it has always demanded that every school accredited should agree to employ in the future only such teachers of academic subjects as possess standard college degrees or their equivalents. How well these academic standards are maintained is shown by the records of the present year. Of the 272 teachers appointed last fall, there are only two failures to comply with the scholastic requirements of the Association. At this rate of improvement it will not be many years before practically all of the teachers of academic subjects in this group of schools will possess bachelor's degrees, or better, from standard four-year colleges or universities.

4. The teachers of vocational subjects have been considered in conjunction with the academic group and hence need but little further discussion. They are differentiated purely for the purposes of closer analysis. The chief feature concerning them is that fully 70% are without standard college degrees. This unfortunate showing very greatly lowers the general scholastic average of the entire teaching body. It is evident from these facts that tne advocates of vocational training cannot hope to secure full recognition for vocational subjects from the colleges and the universities until the scholastic attainments of the teaching force is very materially raised.

TABLE V.

Showing the academic training of superintendents, principals and teachers in public high schools of the Other Accredited Schools.

Superintendents

Higher Institutions	No. Holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total
University of Michigan	..	7	24	..	..	39	..	70
Michigan State Normal College	..	..	1	18	51	1	..	71
Central State Normal School	..	..	..	..	20	2	..	22
Western State Normal School	..	..	..	..	11	1	..	12
Northern State Normal School	..	..	..	..	..	..	..	..
Michigan Agricultural College	..	..	1	..	..	5	..	6
Michigan College of Mines	..	..	..	..	..	..	..	..
Adrian College	..	..	..	..	..	..	..	..
Albion College	..	..	4	..	..	1	..	5
Alma College	..	..	6	..	..	2	..	8
Ferris Institute	..	..	..	..	..	15	..	15
Hillsdale College	..	..	4	..	..	1	..	5
Hope College	..	..	1	..	..	1	..	2
Kalamazoo College	..	..	4	..	..	..	..	4
Olivet College	..	1	2	..	..	..	..	3
Special Schools in Michigan	..	..	..	..	..	..	..	..
Special Schools in U.S. outside of Mich.	..	..	..	..	..	..	..	..
Normal Schs. in U.S. outside of Mich.	..	..	..	..	3	4	..	7
Colleges and Universities in U. S. outside of Michigan	..	3	13	..	..	27	..	43
No. not attending any higher institut'n	..	..	..	..	..	..	..	..
Totals	..	11	60	18	85	99	..	273

Principals

Higher Institutions	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total
University of Michigan	..	1	25	..	..	16	..	42
Michigan State Normal College	..	..	2	2	61	..	..	65
Central State Normal School	..	..	..	..	15	..	..	15
Western State Normal School	..	..	..	..	2	2	..	4
Northern State Normal School	..	..	..	..	2	1	..	3
Michigan Agricultural College	..	..	3	..	..	4	..	7
Michigan College of Mines	..	..	..	..	..	1	..	1
Adrian College	..	..	..	..	..	..	..	..
Albion College	..	..	6	..	..	1	..	7
Alma College	..	..	8	..	..	5	..	13
Ferris Institute	..	..	..	..	..	..	..	..
Hillsdale College	..	..	7	..	..	..	..	7
Hope College	..	..	..	..	..	..	..	..
Kalamazoo College	..	..	6	..	..	..	..	6
Olivet College	..	..	6	..	..	..	..	6
Special Schools in Michigan	..	..	..	..	..	..	..	..
Special Schools in U.S. outside of Mich.	..	..	..	..	..	..	..	..
Normal Schs. in U.S. outside of Mich.	..	..	..	..	..	..	..	..
Colleges and Universities in U. S. outside of Michigan	..	..	2	..	..	6	..	8
No. not attending any higher institut'n	..	..	..	..	..	..	..	..
Totals	..	1	65	2	80	36	0	184

Teachers (Academic and Vocational Subjects)

Higher Institutions	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total
University of Michigan	..	6	80	..	..	35	..	121
Michigan State Normal College	..	..	4	7	134	7	..	152
Central State Normal School	..	..	..	..	41	2	..	43
Western State Normal School	..	..	..	..	26	2	..	28
Northern State Normal School	..	..	..	..	1	..	..	1
Michigan Agricultural College	..	..	23	..	..	4	..	27
Michigan College of Mines	..	..	..	..	..	..	..	..
Adrian College	..	..	7	..	..	1	..	8
Albion College	..	..	21	..	..	4	..	25
Alma College	..	..	9	..	..	7	..	16
Ferris Institute	..	..	..	..	..	23	..	23
Hillsdale College	..	..	11	..	..	1	..	12
Hope College	..	..	11	..	..	..	..	11
Kalamazoo College	..	..	16	..	..	..	..	16
Olivet College	..	..	24	..	..	1	..	25
Special Schools in Michigan	..	..	..	..	..	9	..	9
Special Schools in U.S. outside of Mich.	..	..	..	..	..	6	..	6
Normal Schs. in U.S. outside of Mich.	..	..	2	..	7	3	..	12
Colleges and Universities in U. S. outside of Michigan	..	..	35	..	..	15	..	50
No. not attending any higher institut'n	..	..	..	..	..	..	6	6
Totals	0	6	243	7	209	120	6	59

Summary; Distribution of Teachers of Vocational Subjects

Higher Institutions	Summary: General total of Sup'ts, Prins., Teachers	No. in Manual Training	No. in Domestic Science	No. in Commercial Branches	No. in Music	No. in Art	No. in Physical Education	Total
University of Michigan	233	..	..	1	3	..	..	4
Michigan State Normal College	288	4	3	6	6	2	..	21
Central State Normal School	80	2	4	..	..	2	..	8
Western State Normal School	44	5	4	..	2	1	..	12
Northern State Normal School	4	..	1	..	..	..	..	1
Michigan Agricultural College	40	1	2	..	..	..	..	3
Michigan College of Mines	1	..	..	..	..	..	..	..
Adrian College	8	..	..	..	1	..	..	1
Albion College	37	..	..	2	2	..	..	4
Alma College	37	..	..	..	2	..	..	2
Ferris Institute	38	..	..	10	1	..	..	11
Hillsdale College	24	..	..	..	1	..	..	1
Hope College	13	..	..	..	..	..	..	..
Kalamazoo College	26	..	..	1	..	..	..	1
Olivet College	34	..	..	1	..	..	..	1
Special Schools in Michigan	9	..	..	..	..	..	..	..
Special Schools in U.S. outside of Mich.	6	1	2	1	..	..	..	4
Normal Schs. in U.S. outside of Mich.	19	2	1	2	..	..	..	5
Colleges and Universities in U. S. outside of Michigan	101	3	..	1	3	..	..	7
No. not attending any higher institut'n	6	1	..	..	..	..	..	1
Totals	1048	19	17	25	21	5	0	87

Comments on Table V.

1. The number of superintendents in this group who possess bachelor's degrees, or better, is 71, or 49%. The general distribution is 273, or 53%.

It should not be stated in this connection that many of the superintendents who do not possess college degrees are now pursuing studies at higher institutions, and that some of them are within striking distance of graduation.

2. Of the 145 principals of high schools reported 66, or 46%, hold regulation bachelor's degrees, or better, from standard colleges. The general distribution is 184, or 26%.

3. This group enumerates 470 high school teachers. The number possessing bachelor's degrees, or better, from standard colleges is 249, or 53%. The general distribution is 591, or 27%.

It is interesting to note that the scholastic attainments of the high school teachers of this group, as measured in college degrees, is higher than those of the superintendents of schools or the principals of high schools.

4. The distribution of teachers of vocational subjects is chiefly significant as showing the development that is actually taking place along these lines in the smaller high schools.

TABLE VI.

Showing the academic training of superintendents and teachers in public high schools of the Non-Accredited Schools.

Higher Institutions	Superintendents								Teachers (Academic and Vocational Subjects)								General Total of Superintendents and Teachers	Distribution of Teachers of Vocational Subjects						
	No. Holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total		No. in Manual Training	No. in Domestic Science	No. in Commercial Branches	No. in Music	No. in Art	No. in Physical Education	Total
Universitf of Michigan	..	..	6	..	..	4	..	10	..	..	8	..	..	3	..	11	21	..	..	..	..	..	..	..
Michigan State Normal College	..	..	..	3	30	1	..	34	..	..	2	4	50	1	..	57	91	..	1	2	2	..	..	5
Central State Normal School	..	..	..	..	10	..	..	10	..	..	..	..	13	1	..	14	24	..	..	..	..	..	..	..
Western State Normal School	..	..	..	..	11	..	..	11	..	..	..	..	16	..	..	16	27	..	..	..	..	..	..	..
Northern State Normal School	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..
Michigan Agricultural College	..	..	2	..	..	1	..	3	..	..	1	..	..	2	..	3	6	..	..	..	..	..	..	..
Michigan College of Mines	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..	..	..	..	..	..
Adrian College	..	..	2	..	..	..	..	2	..	..	2	..	..	..	..	2	4	..	..	..	..	..	..	..
Albion College	..	..	1	..	..	2	..	3	..	..	5	..	..	3	..	8	11	..	..	..	..	..	..	..
Alma College	..	..	1	..	..	1	..	2	..	..	1	..	..	..	..	1	3	..	..	..	..	..	..	..
Ferris Institute	..	..	..	..	..	7	..	7	..	..	..	..	..	3	..	3	10	..	..	..	..	..	..	..
Hillsdale College	..	1	3	..	..	..	..	4	..	..	4	..	..	5	..	9	13	..	..	..	..	..	..	..
Hope College	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	1	..	..	1
Kalamazoo College	..	..	..	..	..	..	..	..	..	..	3	..	..	1	..	4	4	..	..	..	..	..	..	..
Olivet College	..	..	2	..	..	1	..	3	..	..	5	..	..	2	..	7	10	..	..	..	..	..	..	..
Special Schools in Michigan	..	..	..	..	..	1	..	1	..	..	..	..	..	1	..	1	2	..	..	..	..	..	..	..
Special Schools in U. S. outside of Michigan	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	1	..	..	..	..	..	1
Normal Schools in U. S. outside of Michigan	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	2	2	..	..	..	..	..	..	..
Colleges and Universities in U. S. outside of Michigan	..	1	..	..	..	4	..	5	1	..	7	..	..	5	..	13	18	..	..	..	..	..	..	..
No. not attending any higher institutions	..	..	..	..	..	..	3	3	..	..	..	..	..	..	5	5	8	..	..	..	..	..	..	..
Totals	0	2	17	3	51	22	3	98	1	0	39	4	80	29	5	158	256	1	1	2	3	0	0	7

Comments on Table VI.

1. The schools of this group are small and undeveloped.

2. No differentiation between the office of superintendent of schools and principal of high schools is feasible.

3. The total number of superintendents is 77,—75 men and 2 women. Of this number 19, or 24%, possess regulation bachelor's degrees, or better. The general distribution is 98, or 27%.

4. There are 143 high school teachers of whom 40, or 28%, have bachelor's degrees, or better, from standard colleges. The general distribution is 128, or 10%.

5. The number of teachers engaged in vocational instruction is negligible.

TABLE VII.

Showing the academic training of superintendents, principals and teachers in all the public high schools in Michigan.

Higher Institutions	Superintendents								Principals								Teachers (Academic and Vocational Subjects)								Summary	Distribution of Teachers of Vocational Subjects						
	No. Holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	General total of Sup'ts, Prins., Teachers (Academic and Vocational)	No. in Manual Training	No. in Domestic Science	No. in Commercial Branches	No. in Music	No. in Art	No. in Physical Education	Total
University of Michigan	..	19	59	..	..	56	..	134	..	13	61	..	..	30	..	104	..	74	649	..	..	125	..	848	1086	8	..	11	7	1	5	32
Michigan State Normal College	..	..	1	28	101	2	..	132	..	..	2	2	79	2	..	84	..	..	26	51	333	55	..	465	681	19	30	35	20	10	7	121
Central State Normal School	..	..	..	0	36	2	..	38	..	..	..	..	17	1	..	18	..	..	..	..	84	3	..	87	143	4	4	2	3	5	1	19
Western State Normal School	..	..	..	..	24	1	..	25	..	..	..	..	3	4	..	7	..	..	..	..	78	5	..	83	115	19	8	1	5	4	..	37
Northern State Normal School	..	..	..	..	..	..	..	..	..	..	..	..	2	2	..	4	..	..	..	..	10	3	..	13	17	3	6	..	..	..	..	9
Michigan Agricultural College	..	..	5	..	..	6	..	11	..	..	3	..	..	5	..	8	..	..	88	..	..	22	..	110	129	7	22	..	..	..	1	30
Michigan College of Mines	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	2	..	..	..	..	2	3	1	..	..	..	..	..	1
Adrian College	..	..	2	..	..	..	..	2	..	..	1	..	..	..	..	1	..	1	37	..	..	5	..	43	46	..	..	1	2	1	..	4
Albion College	..	..	11	..	..	5	..	16	..	..	13	..	..	2	..	15	..	1	74	..	..	21	..	96	127	..	..	10	4	1	..	15
Alma College	..	..	10	..	..	5	..	15	..	..	11	..	..	6	..	17	..	..	31	..	..	7	..	38	70	..	..	..	..	..	..	..
Ferris Institute	..	..	..	..	..	23	..	23	..	..	..	..	..	1	..	1	..	..	..	..	..	60	..	60	84	..	..	32	4	..	..	36
Hillsdale College	..	1	7	..	..	3	..	11	..	1	11	..	..	1	..	13	..	..	35	..	..	12	..	47	71	..	..	6	1	..	..	7
Hope College	..	..	3	..	..	1	..	4	..	..	1	..	..	..	..	1	..	..	17	..	..	2	..	19	24	..	..	..	1	..	..	1
Kalamazoo College	..	..	5	..	..	1	..	6	..	..	9	..	..	1	..	10	..	2	47	..	..	6	..	55	71	..	..	1	..	..	..	1
Olivet College	..	3	4	..	..	1	..	8	..	..	12	..	..	1	..	13	..	..	97	..	..	10	..	107	128	..	..	1	1	1	..	3
Special Schools in Michigan	..	..	..	..	..	1	..	1	..	..	..	..	..	0	..	0	..	..	..	..	..	44	..	44	45	4	9	20	9	..	..	42
No. not attending any higher institut'n	..	..	..	..	..	..	3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	32	32	35	1	..	..	1	1	..	3
Totals	0	23	107	28	16	107	3	429	0	14	124	2	100	57	0	307	0	78	1103	51	505	380	32	2149	2872	66	79	120	58	24	14	361

TABLE VII. (Continued.)

Higher Institutions Outside of Michigan.

Higher Institutions	Superintendents								Principals								Teachers (Academic and Vocational Subjects)								Summary	Distribution of Teachers of Vocational Subjects						
	No. Holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	General total of Sup'ts, Prins., Teachers (Academic and Vocational)	No. in Manual Training	No. in Domestic Science	No. in Commercial Branches	No. in Music	No. in Art	No. in Physical Education	Total Teachers of Vocational Subjects
Alfred College	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Allegheny College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Amherst College	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Armour Institute	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	3	3	2	..	..	..	..	..	2
Baldwin College	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Beloit College	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	5	..	..	..	..	5	6	..	..	..	..	..	..	..
Bethany, W. Va. College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	2	..	..	..	..	..	..	..
Bowling Green College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Buchtel College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Butler College	..	..	1	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..
Carleton College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Carroll College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Carthage College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Central College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Colgate College	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
College of City of New York	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Colman College	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Columbia University	1	4	..	..	..	14	..	19	..	..	..	..	..	5	..	5	..	5	9	..	..	24	..	38	62	1	7	..	..	5	..	13
Cornell University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Dartmouth College	..	1	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	3	5	..	..	..	..	..	..	..
Defiance College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Dennison University	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	4	..	..	..	..	4	5	..	..	..	..	..	..	..
DePauw University	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	2	..	..	1	..	3	4	..	..	..	..	..	..	..
Dickinson College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	2	2	..	..	..	..	..	..	..
Dixon College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Doane College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Drury College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Earlham College	..	..	2	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	3	..	..	..	..	..	..	..
Elmhurst College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Franklin College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	..	4	4	..	..	..	..	..	..	..
Geneva College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Greenville College	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Grinnell College	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Groucher College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Hamilton College	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Hamline College	..	..	2	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..

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Harvard University	..	1	..	..	2	..	3	1	1	1	..	..	3	..	6	..	1	2	..	..	7	..	10	19	..	..	..	..	..	..	..
Hiram College	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1	..	..	..	..	1	2	..	..	..	..	..	..	..
Illinois College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Iowa Wesleyan College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
James Millikin University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Kansas City University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Kenyon College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Knox College	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	2	..	..	..	..	..	..	..
Lafayette College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	1	1
Lake Erie College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Lake Forest College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	..	4	4	..	..	..	..	..	..	..
Lebenon Valley College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..	1	..	7	7	..	1	..	..	..	..	1
Leland Stanford University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	1	..	..	..	..	1
Lawrence College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	5	..	..	..	..	6	6	..	..	..	..	..	..	..
Lombard College	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
McKendree College	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	3	..	..	..	..	3	4	..	..	..	..	..	..	..
Miami University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Middlebury College	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	3	..	..	..	..	..	..	..
Milwaukee Downer College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Missouri Valley College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Mt. Union College	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2	..	..	1	..	3	4	..	..	..	1	..	..	1
Mt. Holyoke College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..	1	..	5	5	..	..	..	..	..	..	..
Muskingum College	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	2	..	..	..	..	2	3	..	..	..	..	..	..	..
New York University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	2	..	..	..	..	..	..	..
Northwestern College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Northwestern University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	..	..	6	..	30	30	..	..	..	1	..	..	1
New Hampshire College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	2	..	..	..	..	..	..	..
Oberlin College	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	9	..	..	5	..	14	15	..	..	..	3	..	1	4
Ohio Northern University	..	2	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	3	..	..	..	..	..	..	..
Ohio State University	..	..	..	..	1	..	1	..	..	1	..	..	..	..	1	..	..	2	..	..	..	..	2	4	1	..	..	..	..	..	..
Ohio University	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	1	..	..	..	..	1	2	..	..	..	..	..	..	..
Ohio Wesleyan University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	1	..	3	3	..	..	..	..	..	..	..
Oklahoma State Agricultural College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Oskaloosa College	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	3	..	..	..	..	..	..	..
Ottawa University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Parsons College	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Purdue University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	1	..	3	3	..	..	..	..	..	..	..
Radcliffe College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Ripon College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	3	3	..	..	..	..	..	..	..
Rockford College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Rutgers College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
St. Lawrence University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Smith College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12	..	..	..	..	12	12	..	..	..	..	..	..	..
Swarthmore College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Syracuse University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3	..	..	..	..	4	4	..	..	..	..	..	..	..
Tufts College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	2	..	..	..	..	..	..	..
Trinity College	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	..	..	..	1	2	..	..	..	..	..	..	..
Union College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	2	2	..	..	..	..	..	..	..
University of California	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	4	4	..	..	1	..	..	..	1
University of Chicago	1	8	..	..	18	..	27	..	..	3	..	..	7	..	10	1	12	23	..	..	74	..	110	147	7	5	3	1	..	..	16
University of Cincinnati	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
University of City of New York	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
University of Colorado	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	2	..	..	..	..	..	..	..
University of Denver	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
University of Illinois	..	1	..	..	..	..	1	..	..	1	..	..	..	..	1	..	..	7	..	..	8	..	15	17	..	..	..	..	..	..	..
University of Indiana	2	3	..	..	1	..	6	..	..	1	..	..	..	..	1	..	..	7	..	..	1	..	8	15	..	..	..	..	..	..	..
University of Iowa	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	3	..	..	1	..	4	5	..	..	..	..	..	..	..
University of Kansas	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
University of Kentucky	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
University of Minnesota	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	3	..	..	..	..	3	4	..	..	..	..	..	..	..
University of Montana	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..

TABLE VII. (Continued.)

Higher Institutions Outside of Michigan.

Higher Institutions	Superintendents								Principals								Teachers (Academic and Vocational Subjects)								Summary	Distribution of Teachers of Vocational Subjects						
	No. Holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	No. holding Doctor's Degree	No. holding Master's Degree	No. holding Bachelor's Degree from college	No. holding B.Pd. Degree from normal school	No. holding life certificates from normal school	No. attending but not graduating	No. not attending any higher institution	Total	General total of Sup'ts, Prins., Teachers (Academic and Vocational)	No. in Manual Training	No. in Domestic Science	No. in Commercial Branches	No. in Music	No. in Art	No. in Physical Education	Total
University of Nebraska	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
University of Notre Dame	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
University of Pennsylvania	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
University of Southern California	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	2	2	..	..	..	..	..	..	..
University of Texas	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
University of Wisconsin	..	..	..	..	..	5	..	5	..	..	..	..	..	4	..	4	1	2	21	..	..	11	..	35	44	5	..	..	..	..	..	..
University of Wooster	..	1	..	..	..	..	..	1	..	..	..	..	..	1	..	1	..	1	1	..	..	..	..	2	4	..	..	..	..	..	..	..
University of Wyoming	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Ursinus College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Valparaiso University	..	..	1	..	..	4	..	5	..	..	..	..	..	..	..	..	..	..	6	..	..	6	..	12	17	..	..	3	..	..	..	..
Vassar College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..	1	..	9	9	..	..	..	..	..	..	..
Wabash College	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	2	..	..	..	..	..	..	..
Washburn College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Wells College	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	2	..	..	..	..	2	3	..	..	..	..	..	..	..
Wellesley College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16	..	..	5	..	21	21	..	..	..	1	..	1	2
Western College for Women	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	..	..	..	..	..	..
Western Reserve University	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	3	..	..	..	..	..	..	..
Williams College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	..	..	..	..	..	..	..
Wilson College	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..
Wittenberg College	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Yale University	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	..	4	4	..	..	..	..	..	..	..
Special Schools in the U. S. outside of Michigan	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	3	..	..	1	..	2	93	..	96	99	10	16	4	5	14	12	61
Normal Schools in the U. S. outside of Michigan	..	..	..	..	11	4	..	15	..	..	..	..	4	2	..	6	..	..	4	..	38	11	..	53	74	9	10	4	..	2	1	26
Colleges and Universities in foreign countries	..	..	2	..	..	..	..	2	..	..	1	..	..	..	..	1	1	1	7	..	..	5	..	14	17	1	..	..	..	..	..	1
Totals	1	13	33	0	11	54	0	112	2	4	19	0	5	27	0	57	2	28	268	0	40	289	0	627	796	36	40	15	12	21	17	141

Comments on Table VII.

1. There are 119 non-resident colleges and universities represented in the high schools of Michigan. This number is exclusive of a large number of non-resident normal schools and special schools which have not been specifically tabulated.

2. On the basis of general distribution 2840 superintendents, principals and teachers have graduated from or attended higher institutions within the state and 796 have graduated from or attended higher institutions without the state.

3. On the basis of general distribution also the following non-resident institutions are represented as indicated: Chicago 147, Columbia 62, Wisconsin 44, Northwestern 30, Wellesley 21, Harvard 19, Illinois 17, Indiana 15, and Oberlin 15.

4. It may be interesting to note that the high schools of Michigan represent superintendents, principals and teachers from all parts of the United States and Europe.

TABLE VIII.

Showing teaching experience of all superintendents, principals and teachers.

	Superintendents				Principals			Teachers			
	North Central Schools	Other Accredited Schools	Non-Accredited Schools	Total	North Central Schools	Other Accredited Schools	Total	North Central Schools	Other Accredited Schools	Non-Accredited Schools	Total
No. teaching their first year	..	..	1	1	1	15	16	171	155	49	375
No. teaching their second year	..	1	9	10	6	20	26	169	114	37	320
No. teaching their third year	1	2	11	14	11	9	20	167	81	21	269
No. teaching their fourth year	1	4	6	11	9	22	31	138	39	8	285
No. teaching their fifth year	3	6	6	15	3	11	14	123	24	5	152
No. teaching more than five but less than ten years	8	32	9	49	19	36	55	324	76	10	410
No. teaching ten or more but less than fifteen years	21	32	12	65	17	15	32	201	24	6	231
No. teaching fifteen or more but less than twenty years	24	41	10	75	13	6	19	102	6	1	109
No. teaching twenty or more but less than twenty-five years	12	16	8	36	5	5	10	73	1	..	74
No. teaching twenty-five years or more'	22	11	2	35	10	4	14	67	..	..	67
Total	92	145	74	311	94	143	227	1535	520	137	2292

Comments on Table VIII.

An examination of the length of service of the superintendents, principals and teachers of the different groups indicates very clearly one of the marked weaknesses of our public school system especially when compared with similar officials in foreign countries. The length of service of the superintendents of the North Central group denotes an encouraging degree of stability, but the brevity of experience and the transitory character of all the other groups, including principals and teachers, show how exceedingly short teaching falls from the rank of a profession. A few statistics may be of interest as showing the relative status of the various groups:

1. In the North Central group only 14% of the superintendents have had less than ten years of experience, while in the other two groups the numbers are 31% and 57% respectively.

2. In the North Central group 37% of the superintendents have had more than twenty years of experience, while 19% and 13% respectively represent the other two groups.

3. In the North Central group 52% of the principals have had less than ten years of experience; in the Other Accredited group the number reaches 79%.

4. In the North Central group 50% of the teachers have had less than *five* years of experience. In the Other Accredited group the number reaches 79%, and in the Non-Accredited group, 88%.

5. In the Other Accredited group 52% of the teachers have had less than *two* years of experience, and in the Non-Accredited group, 62%.

6. Of the 2292 teachers reporting their length of teaching service, 16% are teaching their first year, 30% have had less than two years' experience, 42% less than three years, 55% less than four years, and 61% less than five years.

TABLE IX.

Showing the range of Salaries paid Superintendents, Principals and Teachers.

	Superintendents				Principals			Teachers			
	North Central Schools	Other Accredited Schools	Non-Accredited Schools	Total	North Central Schools	Other Accredited Schools	Total	North Central Schools	Other Accredited Schools	Non-Accredited Schools	Total
No. teachers receiving less than $501.00 per year	....	....	....	..	....	8	8	8	24	29	61
No. receiving more than $500.00 and less than $601.00	....	....	....	..	1	39	40	48	174	66	288
No. receiving more than $600.00 and less than $701.00	....	....	2	2	5	36	41	167	134	33	334
No. receiving more than $700.00 and less than $801.00	....	....	4	4	2	28	30	231	66	9	306
No. receiving more than $800.00 and less than $901.00	....	5	22	27	6	12	18	261	23	1	285
No. receiving more than $900.00 and less than $1001.00	....	13	22	35	8	15	23	208	10	2	220
No. more than $1000.00 and less than $1101.00	1	24	16	41	2	2	4	115	2	2	119
No. more than $1100.00 and less than $1201.00	2	36	7	45	11	0	11	96	1	....	97
No. more than $1200.00 and less than $1301.00	2	19	3	41	8	1	9	92	....	....	92
No. more than $1300.00 and less than $1401.00	4	14	....	18	7	0	7	62	....	....	62
No. more than $1400.00 and less than $1501.00	4	20	....	24	3	1	4	92	....	....	92
No. more than $1500.00 and less than $2001.00	33	11	....	44	21	....	21	117	....	....	117
No. more than $2000.00 and less than $2501.00	15	1	....	16	15	....	15	13	....	....	13
No. more than $2500.00 and less than $3001.00	16	....	....	16	1	....	1	....	....	....	...
No. more than $3000.00 and less than $3501.00	7	....	....	7	3	....	3	....	....	....	...
No. more than $3500.00 and less than $4000.00	3	....	....	3	1	....	1	....	....	....	...
No. $4000.00 or more	3	....	....	3	1	....	1	....	....	....	...
Median Salaries of the various groups	$1500 to $2000	$1100 to $1200	$900 to $1000		$1300 to $1400	$600 to $700		$900 to $1000	$600 to $700	$500 to $600	

Comments on Table IX.

The median salaries of the various groups are sad commentaries on the teaching situation in Michigan. If Detroit and two or three other cities were removed from this accounting, the showing would be still more deplorable.

In this connection Hon. P. P. Claxton, United States Commissioner of Education, in his report for 1913, says:

> "I think we may not expect to get and retain for our schools the services of men and women of high type for less than the wages of a washerwoman, less by half than the wages of a mail carrier, and less by two-thirds than the wages of a carpenter, a bricklayer, or a plumber. We profess to believe in education and talk of our teachers as the standing army of the Republic and of our school houses as the fortifications which hold back the invasions of ignorance, vice, anarchy, and economic inefficiency, but the salaries of teachers are still criminally low, and the sum total of expenditures for schools pitifully and absurdly small."

From Bulletin No. 31, 1915, of the United States Bureau of Education, page 11:

> "The salaries committee of 1913 called attention to the fact that in 1911 wholesale prices were 44.1 per cent higher than in 1897, so that, measured by wholesale prices, a teacher whose salary had remained fixed at $1000 since 1897, would have had no greater purchasing power in 1911 than $693.76 possessed in the earlier year. This upward trend of wholesale prices has continued. The teacher whose salary has remained at $1,000 since 1897 now has a purchasing power equivalent only to $663.57. To put it in another way, a teacher receiving a salary of $700.00 in 1897, and having had such increases that she is receiving $1,000 this year, is less well off than she was in 1897, on the basis of wholesale prices. If she is fortunate enough to have had increases in salary amounting to 50 per cent of her 1897 salary, she will now be economically in about the same condition as in 1897."

CONCLUSION.

An analysis of the various tables given in this study points out conclusively that at least three of the factors which are essential to a good school are interdependent-scholarship of teachers, length of service of teachers, and salaries of teachers. An improvement in any one of these leads to an improvement in the others and hence to better schools. On the other hand, if one drops below a proper standard the other two gradually sink to the same level, and mediocre or inefficient schools result. The most concrete and vulnerable factor, and consequently, the one easiest modified, whether for good or for bad, is that of salaries.

Good schools cost money, more money means higher salaries, and higher salaries mean better scholarship and longer teaching experience. A vigorous and prolonged campaign on the part of the school forces of the state for more money for salaries is essential to any marked and permanent improvement in our schools. How this can be best accomplished has been suggested in various reports of committees appointed to consider the salary question.

1. Reduce all other expenses to a minimum so that there may be funds for increasing teachers' salaries.

2. Appoint active committees to study tax laws for collecting and distributing school funds, also to see to it that tax dodgers and dead heads bear their rightful proportion of the burden.

3. Organize and maintain educational publicity committees—local and state. Let the people know how low teachers' salaries are and how much they really need in order to live comfortably and do their best work.

4. Arrange a local schedule of salaries and urge its adoption. In this effort seek the cooperation of womens' clubs and all the other organizations of the city interested in better schools.

5. Secure the adoption of a law giving State Aid to high schools, especially for vocational subjects.

Much credit is due to J. B. Edmonson, Inspector of High Schools, for his tireless assistance in preparing and arranging the tables.

CLASSICAL CONFERENCE

LATIN INSIDE AND OUT.*

EDWIN L. MILLER, PRINCIPAL OF THE NORTHWESTERN HIGH SCHOOL OF DETROIT.

The situation of Latin in our high schools today is a good deal like that of General Rosecrans' army after the battle of Chickamauga. Apparently on the verge of surrender or annihilation, however, though it is, it still contains the elements of victory. In plain English, while there are now, as there always have been, abundant reasons why Latin should be studied in our high schools, those reasons, in my opinion, are insufficiently understood not only by the public but also by teachers of Latin. To complicate the situation, the internal organization of the subject in the high school is out of date. In competition with the organization of English, for example, it stands today about as good a chance of winning public favor as a Roman galley would of winning a battle with a German submarine. I am beset by such questions as these:

"Why study a dead language?"
"I want my boy to take something practical."
"German strikes me as being more up-to-date."
"English is good enough for me."
"Latin is such a footless subject."

In addition I am stared in the face by the fact that all, except a very few, of the students who take Latin refuse to continue its study longer than two years. In spite of the honeyed arguments of pedagogues trained in the schools of Cicero and Demosthenes, I find that, while fifty-three per cent of our tenth grade students are taking Latin, only fifteen per cent continue it in the eleventh grade, and only twelve per cent stick to the end of the twelfth.

My purpose today is twofold. It is first to suggest, I trust with all due humility, a few lines of argument with which to meet the attacks of those who can see no good in Latin, my hope being that they may prove not ineffective as ammunition in inducing pupils to undertake the subject; and, second, to examine briefly the organization of the course. always with this question in mind: "Can it be so altered that, without losing its present value, it will hold those who now abandon it in disgust at the very point when their enthusiasm should be the highest?" In other words I propose to dis-

cuss two topics: (1) How to get pupils to take Latin; (2) How to keep them after you get them.

In the first place, then, let me ask why the average high school boy or girl of today should study Latin. There are, I think, two main reasons. In the first place, it is, with one exception, for a certain class of minds the most practical subject in the school curriculum. In the second place, when properly taught, it is of supreme value as a step in the process of mastering the English language.

It is practical because it is hard. It sharpens the wits. A trained mind is of more value in life's struggle than the ability to make a box or keep a set of books, just as a steel knife was of more value to a cave man than was the carcass of a bear. With his knife, the cave man could kill countless bears. With a trained mind a man of today can conquer any subject. My experience is that those teachers who know Latin and Greek can always be relied upon to do the practical work of a school. The same reason lies behind Ty Cobb's success with the bat. Before he steps up to the plate he always spends a few moments in swinging three bats at once. After that one bat seems light to him. To any body who has had the will and the gumption to master the syntax and the accidence of Latin, the task of learning how to keep a set of books is mere child's play. I know a boy who, after finishing his Caesar with reasonable success, decided that he must change to the commercial course. He elected bookkeeping. On the Friday of the first week of the term he took home his cash book, his journal, his ledger, and his instruction book. He worked at them that afternoon, on Saturday, and, I fear, on Sunday. At all events, when he returned to school on Monday, he had completed all of the entries required in Bookkeeping (1), and had proved them to be correct by striking a trial balance. Though he had previously spent four hours a day on his Latin, he had in two days completed the work of five months in bookkeeping. He saw the point, and went back to his principal, to whom he said: "I guess there is nothing in this bookkeeping for me. At all events I can't afford to be idle. I want to go back to my Latin and what is more I want to begin Greek." That was years ago. Since then he has often told me that the classics nearly killed him but that they were his salvation because in mastering them he learned to labor terribly and never to abandon an undertaking that he had begun.

I remember another case in point. A boy who was taking the commercial course was directed by his English teacher to the reading of biography. After a time he went to the principal of the school and said: "I have been studying the biographical dictionary, but I cannot find in it what I have been looking for." "What have you been looking for, John?" "I have been trying to find the lives of men who have taken the commercial course. I can find thousands who have had Latin and Greek, but the others I can count on my fingers. I am ambitious. I wish to be useful in large affairs. I wish to change over to the classical course."

The student who takes Latin is really taking a course in the foundation of English. It is as essential to the mastery of English grammar as is a deep excavation for the foundation of a modern sky-scraper. Of course, it is less fun to labor with a shovel at the bottom of a hole forty feet deep than it is to sit in a roof-garden four hundred feet above the earth, with a glass of lemonade on the table in front of you, while a Hungarian orchestra blasts great soul-satisfying chunks of melody out of the circumambient atmosphere. Similarly, it is more fun to study the philosophy of literature than it is to master Latin roots. But, in both cases, the digging has to be done before the fun can be enjoyed. I know and you know, of course, hundreds of excellent people who never studied Latin, but how many of them use "I" and "me" with unerring precision? About three-quarters of our vocabulary is of Latin origin. Of course one can discover what these words mean by consulting the dictionary, but I defy any human being to remember their meaning if he relies on this process alone. It was a wise man who said that a dictionary is a graveyard of words. Graveyards are not interesting. A stuffed lion is not half as entertaining as a live one. Nobody can get an idea of what a live steer is like by eating a beeksteak. Similarly, nobody ever realized the force of a word like "infant," for example, unless he had met with it in its native jungle. What does a person who is Latinless understand if you tell him it comes from "in," which equals "not," plus "fant," which is the present active participle of "for," "fari," "fatus," minus its case ending? And even if the dictionary would serve in such a case, one cannot carry it in his pocket. Even if he could he wouldn't lest he become as ridiculous as those crude tourists who, in ante-bellum days, paraded Europe visibly armed with red guide-books. No! The only way to get an English vocabulary ever ready for use is to get Latin.

They say that Latin is a dead language. It is not. It is spoken today in Italy, France, Spain, Portugal, the unsubdued remnant of Belgium, and all of South and Central America, to say nothing of the peaceful land of Carranza, Villa, and Co. It is the livest element in English, except Greek. The Century Dictionary was first published in 1891. In 1909 a supplement containing 100,000 words was added. These were all new. The language therefore grew during those eighteen years at the rate of over 5,000 words a year. The majority of these were scientific terms derived from Latin and Greek. The person whose knowledge of Latin and Greek was insufficient to enable him to determine their meaning could not if he would find them during that period in the dictionary. In other words, instead of being up-to-date, he was eighteen years behind the times. But I state the case weakly. Big as the Century Dictionary is, its editor says: "It should be added, however, that the words and forms included, great as their number is, are still a selection. Many chemical and mineralogical terms, for example, have been added, but, of course, not all; important new Latin names in zoölogy and botany have been admitted, but relatively only a few; the obvious derivatives (which,

actual and possible, are many thousands in number) from names of families, orders, etc., in zoölogy and botany are, with a few exceptions, not given."

Such arguments as these have weight with most ambitious boys, girls, and parents. There are several others, which are equally sound but perhaps less appealing. Among these are the following:

1. Roman literature is in itself of some value. For some reason it cannot be translated. While we have fairly good versions of Homer and Plutarch, we have none of Virgil, Horace, and Livy. The Roman solidity perhaps is less capable of being transported than the lightness of the Greek. It is easier to move a diamond than a mountain, but on the whole the Matterhorn is a nobler object than the Koh-i-noor. And even if Emerson walked across the bridge over Charles River instead of swimming, he probably would have confessed that a swim produced certain reactions which the walk did not.

2. Familiarity with Roman ideals is worth while. The records of a race who for centuries ruled the world must contain material for the mental and moral sustenance of us, their successors, whose ideals and customs have countless roots in that great past. Roman virtue is an inspiration still. The decline and fall of Rome afford a warning even now.

3. It is quite impossible for any human being to gain a scholarly understanding of Italian, French, German, or English literature without a wide and reasonably accurate knowledge of the Latin language and its literature. Since the days of Erasmus every European literature has been characterized by countless phenomena both of detail and spirit which can be traced to Latin origins and which, unless so traced, lose all their charm and most of their significance.

4. There is a far-flung demand today that we substitute modern literature for the English classics in our schools. We are told that we ought to read Arnold Bennett and Chesterton instead of the old stuff. The chief reason advanced for this contention is that the new stuff is more easily understood by adolescents, because it is simpler. As a matter of fact, however, the reverse is true. The subtleties of our best modern writers are entirely beyond the comprehension of the average high school pupil, thank God! I have been reading some of the new war poems. Most of them are Greek to me. They convey no impression beyond a vague feeling that the author entertains a conviction that his country is right and the enemy wrong. They are full of allusions which are unintelligible to boys and girls. As a matter of fact, in order to get real literature that is simple enough to appeal to adolescents, one is almost forced to go to the writings of antiquity. The Odyssey is the book of books for ninth graders. With the exception of Shakespeare, Burns, Scott, and Dickens, English literature is permeated with subtleties that delight the scholar but repel the tyro. The literatures of Greece and Rome have, therefore, in their simplicity a quality which, it

seems to me, is now unattainable except in juvenile literature, but which in them is united with all the best elements of virility. Personally, for example, I cannot make head or tail out of the military passages of Froude's Caesar. They become intelligible only when checked by the Latin of the commentaries, for I defy any human being, except a boy in a Caesar class, to read, much less to understand, a page of any existing translation of Caesar. In other words, boys and girls can get from Latin and Greek literature certain highly desirable things which modern literature does not contain.

These, as I understand them, are the chief arguments for the study of Latin in the high school. Before I can conscientiously use them, however, to induce pupils to enter Latin classes, it will be necessary for certain widespread reforms to be made in the organization of the Latin courses in our high schools.

First, more time than one year is needed for the rudiments. I am told that in the German gymnasia, the great English public schools, and some American private academies in Massachusetts and New Jersey, not less than two years is now allotted to this work. While I am perfectly convinced that the common people of Michigan are just as smart as the aristocracy of Prussia, England, and Massachusetts, I do not believe that their children can learn twice as fast. The Latin primer should, I am convinced, be begun below the ninth grade or ended above it. It is too tough a morsel for the little folks to swallow and digest in a twelvemonth, even though Professor D'Ooge's new book is as scientifically put up as one of those delicious packages which emanate from Battle Creek. Perhaps the junior high school will eventually solve this part of our problem for us. In the meantime I see nothing for it but to let the first-year book run over into the tenth grade.

The Latin reading in the high school is now, to put the matter mildly, organized on lines that are a trifle archaic. The subject-matter of Caesar's commentaries and Cicero's orations is not quite on a level with adolescent interests. Latin teachers may profit by a study of what has been done by their colleagues in the English department toward discovering and using those books which students can understand and hence do enjoy. The main thing in this connection is to shift attention from Caesar to Johnnie. Teach Johnnie; don't try to teach Caesar. Most of us, I fancy, would regard with some disfavor a course in English which consisted of four years of grammar tempered by four chapters of General Grant's "Memoirs," six of Burke's Speeches, six books of "Paradise Lost," and two thousand lines of Spenser's "Faery Queen." As a matter of fact the "Faery Queen" and "Paradise Lost" have already been abandoned as not being proper reading for children, General Grant's "Memoirs" have never been introduced into the high school, and Burke's Speech on Conciliation, magnificent as it is, is not seldom misunderstood even by teachers, let alone pupils in the fourth year of the high school. Lest you do not believe this latter statement, I will tell you why I make it. Not so many years ago and not so many thousand miles

away from here, I asked a class who had just finished Burke to tell me how many members he proposed to have the colony of New York send to the British Parliament. Not one knew. "Very well," I said. "I will give you a week to find out." At the end of the sixth day the teacher came to me and said: "Mr. Miller, we have sought the answer to your question in all the books we could lay our hands on. We cannot find anything on that point." The answer is writ large in Burke himself, but she has missed his fundamental proposition, which is that no colony should send members to Parliament, but that each colony, through its own assembly, should have the power to grant or refuse aids to the crown, just as the Canadian, Australian, and South African parliaments do today. Now, I ask, if such things can happen in a fourth year English class, what is to be expected in a third year Latin class, handicapped as it is by one year less of experience, by a difficult foreign language, and by subject matter equally difficult?

It seems to me that a searching investigation of the whole field of high school reading of Latin should be made, for the purpose of revising it so as to make it fit the capacity of high school students. Probably enough Latin suitable for this purpose could be found if a diligent search were made. I see no more reason for rejecting everything outside of the Golden Age than I see for rejecting all of our English classics except those written between 1590 and 1674. We do not reject Homer because he made the mistake of not being born an Athenian. Why not examine all of the Latin extant from Ennius down to Boethius in order to get the right stuff? Change, simplify, select, do anything to arouse enthusiasm and encourage the efforts of the learner. Only get rid of the situation with which we are faced today.

The reorganization of the work in Latin prose also seems desirable. The process of translating back into Latin a few sentences of Caesar and Cicero so altered that the pupil must use different cases and tenses is about as dreary an occupation as the ingenuity of pedagogues has succeeded in devising. Being dreary, it is necessarily unprofitable. It has occurred to me that perhaps a Latin prose book constructed on the same principle as Mr. Carl Bacon's admirable German prose composition book might improve the situation. He builds his exercises on easy models that, in themselves, are interesting because they give a rather connected chronological survey of German history, beginning with the Hermannschlacht and ending with modern German science and commerce. Among other agreeable bits are stories of Nuremberg, Albrecht Dürer, Frederick the Great, George Washington, Queen Louise, and Bismarck. It is all human and as entertaining to girls as to boys, which is more than one can say for those parts of Caesar which we now read, though the story of Cotta and Sabinus in the first book is as good as Ivanhoe, and the visit to Alexandria in the Civil War has furnished Bernard Shaw with material for a highly human play. Another scheme which might bear fruit would be to set our boys and girls to translating into Latin some of the English primers used in the grades. We have also tried,

with some success, the plan of translating Kipling's Just So stories, which at least has had the virtue of making the prose day a happy one. Perhaps the most successful of our experiments, however, grew out of a case of truancy. Two boys were caught, and, to punish them, their Latin class wrote essays describing their iniquity and pointing out the deplorable moral effects of such wickedness. Here is one of the compositions which resulted from this assignment:

"James Williams et Deanus Jacobus a schola aberant uno die. Se excusaverunt dicentes: "Ego aegrotabam" et "Ego ivi ad medicum quod mei oculi erant mali!" Sed alteri pueri non huic rei crediderunt. Nam nostri amici in altera schola nobis narrabit eos ivisse ibi et remansisse duas horas! Nos non cognoscimus quid facerent reliqua parte diei. Fortasse iverunt ad "Pulchram Insulam" et viderunt naves onerarias in flumine! Proximus dies erat non laetus: nan omnes pueri eis riserunt, dicentes: "Ubi eratis heri?" Sed pessimum erat cum M. Miller eos videret et eos ad sua castra vocaret. Dixit multa et crudelia et graviter eos accusavit et eorum poena erat magna. Necesse est manere omnem diem in schola et omnes magistri eos acriter puniverunt. Omni libertate carebantur et necesse est manere in schola a prima luce usque ad occasum solis. Sed supplicium erat iutissimum quod pueri erant pessimi."

In conclusion I will give you a bit of consolation in the form of a passage I found recently in Carl Schurz's autobiography:—

"My departure from the Gymnasium brings me to the question whether or not the curriculum of the German Gymnasia is out of date and unpractical. Is it wise to devote so large a share of the time and strength of the pupils to the study of Latin, Greek, and classical literature? Would it not be more beneficial to the rising generation if there should be substituted for Latin and Greek the study of modern languages and literatures, a knowledge of which would be much more useful in the practical affairs of life? This question cannot be avoided. Latin is no more what it was in most of the countries of the so-called civilized world up to the beginning of the eighteenth century, the language of diplomacy, law, philosophy, and science. Even the ability to sprinkle one's conversation with Latin quotations is no longer necessary in order to pass as a man of culture among men of culture. The literatures of classical antiquity are no longer the only ones in which we find great masterpieces of poetry, models of historical writing, and the treasures of philosophical or scientific thought. In all these lines there are rich treasures in modern literatures, and even the man who does not understand the ancient languages has access to the masterpieces of the ancient spirit in translations.

"And yet, even now, when I ask myself in my old age what part of the instruction which I received in my youth I would be least willing to part with, my answer could not be for one moment doubtful, although I have unfortunately forgotten much in the Latin and Greek which I knew as a student. But the aesthetic and moral precepts which those studies gave me, the ideal conceptions which they enabled me to form, the spiritual horizon which they opened to me, I have never lost. Those studies were not merely a means for the acquisition of knowledge, but, in the best sense of the word, a means of culture, and therefore they have remained to me throughout my whole life an inexhaustible source of inspiration and pleasure.

"If I again had the opportunity to choose between the classical studies and the so-called useful, so far as I myself am concerned, I would without hesitation choose essentially the same curriculum which I enjoyed in my youth. One reason why I would do this is because I could never have taken up the classical studies in later life had I not begun them in my Gymnasium years. The second is because the knowledge of the ancient languages in later years has been of indescribable assistance to me in the acquisition of modern languages. He who knows Latin can not only learn with more ease French, English, Spanish, Italian, and Portugese, but can also learn them much better. I can say for myself that in mastering Latin grammar I also acquired a weapon for learning with the greatest ease the grammar of all the modern romance and German languages. Indeed, the mastery of Latin grammar made this latter task mere play for me. While I am perfectly willing to admit the force of the practical argument as a reason for the reformation of the curriculum, nevertheless, so far as I personally am concerned, I wish to go on record as saying that I possess much that is good and inspiring for which I must thank the classical course. I would not, indeed, willingly be without it."

BY-WAYS IN THE TEACHING OF HIGH SCHOOL LATIN.*

MISS LENA M. FOOTE, LA GRANGE HIGH SCHOOL, INDIANA.

"Truly a wonderful man was Caius Julius Caesar!

Better be first, he said, in a little Iberian village, Than be second in Rome, and I think he was right when he said it."

With this quotation I opened my first Caesar class, and with it, I may say, I began the collateral work in the teaching of Latin whereby I have striven to inject life into a so-called "dead language." This Caesar class possessed enthusiasm and the spirit of co-operation to an unusual degree, and were therefore soon named the "Tenth Legion." The class frequently presented petitions for various favors, sometimes headed by some such legend as *Labor omnia vincit,* sometimes expressed entirely in Latin. The ambition of these nine students had been to build a model of Caesar's bridge large enough for the whole class (including the teacher) to stand upon, but they were finally forced to content themselves with one which measured about thirty-six inches in length which they left as a memorial.

When this class progressed to the study of Cicero's Orations, the suggestion that they write a symposium on the circumstances and delivery of the First Oration met with ready response. Some worked on the events leading up to the oration, others drew up a brief of the speech, while others gave Catiline's reply.

The Virgil class were asked to write compositions on such topics as "The Women of the Aeneid," "Omens and Sacrifices," "Figures of Speech" in the various books, "The Contests of the Fifth Book." I recall one es-

pecially good paper dealing with the latter topic, in which the young man to whom it was assigned imagined himself with a party of travellers visiting Sicily, by chance on the very occasion of a revival of the old Trojan games. In this connection the writer gave a clever comparison with modern school athletics.

Upon changing to Greenfield, Indiana, I found the size of the Latin classes considerably larger, and conceived the idea of organizing a "Latin Club" or "Societas Classica" as we called it. We began with, and easily maintained, a membership of about seventy-five, holding the meetings fortnightly, after school, and basing the programs upon a systematic study of Roman private life. The meetings were held in the Latin room, to which we were allowed to remove the piano from the High School assembly room, for the special occasions. When possible we included Latin songs in the program, otherwise some member furnished a piano solo. We were fortunate in having in the society several amateur artists who frequently illustrated the topics with black-board drawings copied from the text-books.

Our first meeting was the occasion of a visit and address by Professor Gelston of Butler College, Indiana, who had spent a year in Rome, and was enabled to give us first-hand knowledge of the remains of ancient Rome, greatly to the delight of his audience. On the Ides of March, the club held an open meeting at which one member presented a brief biography of Caesar; another boy gave a masterly discussion of Caesar's war engines illustrating his description by practical demonstrations with several models constructed by the Caesar class. The closing number on the program consisted of the presentation of scenes one and two from the third act of Shakespeare's Julius Caesar, by fifteen boys costumed in togas contrived from sheets with purple crepe-paper borders. On another occasion, one number of the program was called *Colloquia de Roma,* and consisted of a description of Roman buildings. The work was presented in an informal manner, one girl, the hostess, giving an account of her pretended recent trip to Rome, for the benefit of her two friends who made excellent and unusually well-informed interlocutors. Of course the young traveller's portfolio of views of Roman subjects which they were fortunate enough to secure must be produced during the conversation, and they very kindly held up each picture for inspection by the audience.

In anticipation of the Centennial celebration of Lincoln's Birthday, the Cicero class translated Lincoln anecdotes into Latin. O! What a thumbing there was of the Latin lexicons in the attempt to find classic words in which to express modern ideas! And how much mid-night oil was consumed by the teacher in correcting those forty compositions and impressing upon the youthful composers the fact that English and Latin idiom are not identical. We survived the ordeal, however; the compositions were neatly copied, the artist of the class designed a cover, displaying a very good portrait of Lincoln and the words *Abrahami Lincolnis in Memoriam,* and we all

felt that the results justified the effort. The Freshmen that year, not to be outdone by Juniors, insisted upon writing Valentines in Latin.

In 1911 I faced new responsibilities and a new group of Latin students at LaGrange, a county seat in Northern Indiana, the home of the "Corn School." The first year it seemed that general interest in the annual Harvest Festival would over-shadow any special interest in the Classics, so that I accomplished little more than to establish the nucleus of a Latin library which the Board of Trustees granted at our request.

During the next year the boys of the Caesar classes proved their efficiency in making models, working upon them in groups, so that the Department soon boasted of a ballista, a catapult, two onagers, a pilum, a gladius, a ladder, a battering ram and a shield. To these there have since been added a sling, a Roman camp, a tower, a wagon, an interior of a Roman house, and dolls costumed to represent a consul, lictors, soldiers, and a Roman matron.

The Board of Education purchased for us a set of Miss Frances Sabin's charts and manual illustrating "The Relation of Latin to Practical Life," and the filling out of these charts has been a never-failing source of pleasure, as well as profit, to the boys and girls.

When we concluded the translation of the Campaign against the Helvetii, the review was conducted by means of compositions on the following topics:

1. A Lost Cause--the Helvetian Migration as Described by One of the Emigrants. (Chaps. 1-29.)
2. The Roman Eagle Defeats the Gallic Horde—a Letter from a Roman soldier. (Chaps. 1-29.
3. The Gallic Triumvirate—the Story of the Conspiracy of Orgetorix. (Chaps. 3 and 4.)
4. The Departure—a Word Picture. (Chaps. 5 and 6.)
5. The Return. (Chaps. 27-29.)
6. A Lost Opportunity—a Story Told by Labienus to Marcus, his Grandson. (Chaps. 21-22.)
7. Liscus—The Interview between Caesar and the Aeduan Chiefs. (Chaps. 16-20) in dramatic form.

The review of the entire Campaign in the form of a letter, was written by one of the boys who imagined himself a lieutenant writing to his sweetheart in Rome, while the army was resting and he was recovering from wounds which he had received in a valiant attempt to save Caesar from the murderous onslaught of a Gaul. The dramatization of Caesar's interview with the Aedui was chosen by two of the boys who, I had thought, possessed no special literary ability, and I was agreeably surprised when I read the dialogue which they had originated quite in Caesar's style.

Later in the year, the class made drawings relating to the work in Caesar or to Roman private life, in anticipation of the County School exhibit which is an important feature of the annual "Corn School" week.

For several years, the Cicero classes have recast (in dramatic form) the third Oration against Catiline. The scene of the conspiracy has been especially well done by several of the class, considering the fact that the conversation must necessarily be imagined. For the last two years we have had a debate by members of the class, when they finished reading the fourth Oration, on the question: *"Resolved,* That Cicero and the Senate were Justified in Condemning the Catilinarian Conspirators to Death." Last spring the debaters on the negative won out, proving conclusively that Cicero and the Senate were *not* justified in condemning the conspirators to their untimely fate. One of the judges, a lawyer, afterward remarked that although his sympathies and those of his fellow judges were with the affirmative side, yet the girl who led the negative, marshalled her facts in such splendid array, and quoted Abbott, Political Institutions with such telling effect that prejudice fell before logic.

This same Junior class wrote descriptions of the Roman Forum and illustrated their papers with the little blue prints, sold by the Earl Thompson Co., Syracuse, New York, for one cent each. We also purchased from the Perry Picture Company seventy-five views related to Roman life, literature, sculpture and architecture. Taking a day off from recitation, the class, armed with library paste, and brown mounting paper went to the laboratory where we could use the long tables, and mounted and discussed the pictures, which were afterward collected into a port-folio for handy reference.

The Virgil class also furnished its quota of extra work by writing reviews of the first and second books of the Aneid; retelling the episodes of the third book, each member being responsible for a single incident. The fourth book was dramatized. The contests of the fifth book were assigned to individuals and written up in the same manner as the third.

The crowning feature of the year was a Latin play and Vestal Virgin drill given by members of the three upper classes. This was something quite unusual in LaGrange and interested friends crowded the High School assembly room to witness the production. The play was "A Roman Wedding." The costumes for play and drill, made by the girls, were of five-cent cheese cloth, stencilled in gold. The sandals were made from ordinary insoles and tape. With these were worn flesh-colored cotton hose. The boys wore sheets for togas.

At the beginning of this present school year, the Virgil class, including nine members, determined to present the play of "Dido—The Phoenician Queen." Parts were assigned the second week in October and two weeks later rehearsals began. Meantime a chorus of under graduates, numbering twenty-five, was being drilled by the supervisor of music, and every spare moment was devoted to the making of costumes.

Four suits of armor were contrived of card-board and silver paper. The helmets were made in part from the crowns of derby hats which were first shellaced and then covered with aluminum paint. The boys of the

Caesar class made the spears, the bows and arrows, and the sword of Aeneas by which Dido met her fate. The girls assisted by preparing hundreds of pink and white tissue-paper blossoms which, fastened to branches, to represent the crab-trees of the play, greatly enhanced the beauty of the stage-setting.

The costumes of the ten Carthaginian maidens who sang the "Hymn to Apollo" were of cheese-cloth in the delicate tints of the dawn, pale blue, pink, lavendar, green, yellow and several of white. The gowns of the other women of the play were of cheese-cloth or silkoline in the proper colors, while cotton poplin and sateen were employed for the costumes of the courtiers. Sateen in royal purple stencilled with gold paint proved very effective for the robes of Juno and Dido, and for the mantle of Aeneas. Gold paper in delicate cut-out designs made pretty ornamentation for the majority of the gowns and was much less expensive. The costumes of the minor characters were made of cambric or other cotton goods in dark shades. Brown outing-flannel made very good traveling cloaks for the Trojans. On the evening of November 2 we presented the play in the Opera House to a large audience.

I have been interested in collecting from the students, statements of their opinions regarding these plays. All agree in saying that they enjoyed the work, and, although the rehearsals sometimes involved the sacrifice of pleasure, yet the final success was well worth the effort; that the plays increased their knowledge of society and customs in ancient times, and created a deeper interest and enthusiasm in the study of Latin. The committing of lines in the Latin play helped in training them to translate quickly, and as one student said, "it created a feeling that Latin was by no means a "dead language" but filled with life because she could really converse in Latin.

HISTORY CONFERENCE

A FULLER DEFINITION OF HISTORY REQUIREMENT.

PRINCIPAL N. B. SLOAN, BAY CITY.

I am asked to discuss the paper read by Vice-Principal J. R. Sutton, of Oakland, Cal., before the Panama-Pacific Historical Congress in July, 1915.

A pamphlet containing this paper has been published by Allyn & Bacon and very generously distributed so that I presume most of you are familiar with its content.

The specific question as stated in this paper and discussed by Mr. Sutton is as follows: "Is it in the interest of history in schools that a fuller definition of the history requirement be made by the American Historical Association, showing the especial points to be emphasized and those to be more lightly treated?" But in order that we may have clearly before us just what we are trying to consider, a brief restatement of the arguments advanced by Mr. Sutton seems admissible.

After stating the question the writer in his opening sentence says: "At the risk of seeming ultra conservative, I venture to answer this question in the negative." He then reminds us that prior to 1899 there was very little uniformity in the history courses given in the secondary schools. In that year the committee of seven made its report and the schools at once began to model their courses in accordance with the plan outlined, until at present, the four-year course is almost universal.

Then in 1911 came the report of the committee of five with the suggestion that English and Mediaeval European history be combined in the second year with emphasis on English history and that modern history be given in the third year, and it is shown that this plan has not been followed to any considerable extent. He contends that a new report would only result in disturbing the present condition of reasonable uniformity since some schools would probably accept the new plan while many others would not, thus the result would be another period of confusion.

He argues that the desire for a new report grows out of certain definite lines of dissatisfaction with the plan of the Committee of Seven and states these lines of dissatisfaction as follows: 1st, "That the course in history should cover three years instead of four, English history as a separate course being discontinued." 2nd, "That the point of division between the first and second year's work be moved along from the year 814 to 1600 or 1700." 3rd, "That American Colonial history be disposed of during the second year as a part of European history, leaving the third year for American history and government since 1700."

It is admitted that English history as a separate course is being omitted, this course being forced out by the multiplicity of other courses which are demanding and finding admission into our already overcrowded curricula, but that the larger schools can and should continue to give the course.

According to this paper the most persistent point of attack against the present history plan is directed against the year 814 as the dividing point between the first and second year's work. His answer to this forms the main body of the discussion. His argument is that the first year's work in history is and must continue to be given in the 9th grade. The 9th grade mind is incapable of comprehending more than is now covered. It is impossible to further condense or abbreviate the history of that period without losing sight of the main drift of the story and thus destroying the value of the whole effort.

Then follows a statement of the real purpose of teaching history so excellent and terse that I cannot refrain from quoting it:

"Our real purpose is to give our pupils a deeper sypmathy for humanity, and a broader vision of life; to give them a surer grasp of present day social, economic, and political problems; to develop in them the power to search intelligently for the truth relative to delicate and complicated human affairs, and to be able to distinguish between truth and near-truth; and finally to help them acquire such moral strength as will come from contemplating the successes and failures of men in the past—for the causes of these successes drive home with unanswerable logic the truth of that great moral law that 'whatsoever a man soweth that shall he also reap.' If our work is well done, these things will abide though the facts of history fade from the mind."

In conclusion, Mr. Sutton says: "I do not believe that any radical change in the history course as outlined by the Committee of Seven is advisable. Individual school systems should be encouraged to try such modifications of the course as seems wise to them. For example, I am strongly in favor of giving a year and a half to American history and government. Those who feel so inclined may profitably try the experiment of adding the mediaeval period to the first year's work or of making any other change that appeals to them." In other words the very uniformity which, earlier in the discussion is held up as such a worthy desideratum, is here discarded to give place to the medley of experiments resultant from the attempt of each individual school in trying out something which to them may seem desirable.

Such, Mr. Chairman, is the general line of argument. The paper is unquestionably an able one. Indeed, I confess at the outset that it is so well stated and so admirably drawn, that taking each individual argument by itself I find myself in substantial accord with that proposition considered singly. It is only when considering the general trend of the discussion and the inevitable final conclusions that I find myself inclined to take issue with its logic.

None of us, I think, will care to deny the splendidly unifying results

which have come from the report of the Committee of Seven. Order was brought out of the preceeding chaos and a vast improvement in the content of the course and in the quality of teaching has undoubtedly followed. The schools did take up the suggestions rapidly and the text-book writers and publishers responded with alacrity and vigor. But by the same argument, another report which shall mark a second advance and which shall meet the well-nigh universal criticism and dissatisfaction which is now being voiced might as readily be accepted and as uniformly adopted as was the report of 1899.

To my mind the entire difficulty lies in a misconception of the whole function and scope of the subject of history in the American high school. Let me state my proposition at the outset, that there may be no confusing of the issue or no misunderstanding of its trend.

The center and goal toward which all history work in the American high school should lead is to a reasonable understanding of the history of America and a fair comprehension of America's place in the great story of historic evolution. Now, my friends, permit me just here to plead eternal innocence to the charge of making this statement in the spirit of ultra-patriotic fervor or of fourth of July political oratorical frenzy. Indeed, I have in mind quite the contrary. I make the statement after several years' experience in attempting to teach American history to high school students and in trying to disabuse their minds of the many misconceptions which the frenzied fourth of July orator has so insidiously disseminated and which the American type of ultra-patriotism has so persistently believed.

That American colonial history should be taught as a part of the history of England and Europe is becoming in my mind a most settled conviction. In order that the student may have a fair understanding of America's place in the great story of historic evolution the European background of that history must in some measure at least be comprehended. Just here I would like to make use of Mr. Sutton's own argument but I would use it to establish quite a different point. He says:

"Whatever one may think of this or that item as a topic appropriate for consideration in a secondary history course, the fact remains that Egypt, Babylonia, Assyria, Persia, the various Greek cities, Macedonia, and Rome, each had a continuous story, which takes its place as a part of the larger story of the ancient world. Here are certain facts, certain events leading to certain results, certain theories put into practice, certain great movements, rivalries, alliances, tragedies, advances toward righteousness, all blending together into a wonderful story. Men dispute as to many of the details, but not as to the main drift of the story. . . . If one is dissatisfied with the selection of material found in the various textbooks of ancient history, let him make his own selection; but let him remember that his selection must make clear the main drift of the story of the ancient world. That is independent of him and he cannot change it."

What is here referred to as "The main drift of the story" is, I think, the same thing that I mean in the expression "historic evolution." This to my mind is the great, essential point in history teaching in high school. If the student can be brought up to the study of American history with a reasonable comprehension of the "main drift" up to that point; if those institutions, customs and laws which have persisted can be pointed out and their history traced; if the growth and development of some of the fundamental principles of free political institutions can be fixed in the student's mind he is then ready to take up the study of our own history as such, to study it critically and with some hope of possible understanding. I would not eliminate the study of English history from the curriculum of the high school but I would have it studied from an entirely different viewpoint and for a wholly different reason. The study of English history for the sake of a knowledge of English history as such to my mind belongs in the college course but the study of English history for the sake of furnishing a background for the understanding of American history is in my opinion a very essential part of the high school history course. The same thing might also be said of the history of Spain, of France, of the Netherlands and of Sweden. The protestant reformation and the resultant religious unrest culminating in the Puritan movement and the ultimate crystalization into the sentence "Congress shall make no law respecting an establishment of religion or prohibiting the free exercise thereof" takes one far afield into the history of Germany and of central Europe and throws a gleam of light backward across the period of the Renaissance and into the gloom of the dark ages which might possibly furnish a spark of intelligent interest to the high school boy who is struggling to comprehend. The "main drift of the story," yes, by all means preserve it. This is the great essential, but let us see to it that the main drift is not so hidden and concealed by the mass of material that is being carried on the stream as to cause the current to be so sluggish that no movement can be discovered.

Have I said enough to make my meaning clear?

Mr. Chairman and members of this history section, may I say in conclusion that I hope to live long enough to witness the time when the graduates of our American high school shall go out from its doors equipped with a knowledge of the history of our own country and with a reasonable comprehension of the development of its instructions; that the history of this country is a part of a great story of historic evolution; that the great ideas of political and religious liberty which have become a part of our inheritance are the results of a long process of growth and struggle and are not at all the resultant of sudden meteoric flashes of peculiarly American genius.

Thus it seems to me there will come to be a greater pride in its qualities and a greater assurance of its permanence and a more substantial and enduring conviction that the summit of human accomplishment along the lines fought for by the Fathers has not of necessity been attained.

PHYSICS AND CHEMISTRY CONFERENCE

A SECOND SEMESTER'S COURSE IN CHEMISTRY FOR BOYS.

MR. WILLIS H. CLARK, CENTRAL HIGH, DETROIT.

I feel somewhat diffident about speaking before this group; for I fear that I shall be accused of carrying coals to Newcastle. The experience of most of you has extended over a longer period than has mine. From the six years that I have been at the work, however, I have come to some rather definite conclusions; one is, that we are wasting the time of those boys who are most apt to make their mark in the world; and we are wasting their time by asking them to do tasks that are not tasks, to solve problems that are not real problems. If we start with a boy of high promise, and at the end of the year have helped turn out a very average sort of a fellow, I believe we are guilty of something very close to a crime; but when we place the strong and the weak in the same mould, how can we expect to prepare for anything else than mediocrity?

Because I was so thoroughly imbued with the idea that the strong boy should not carry the burden of the weak upon his back, nor the dull be discouraged by the brilliance of his neighbor, I resolved, if possible, to carry out a plan of segregation based upon ability.

Last semester I had about a hundred boys taking beginning chemistry. Of this number, twenty-eight were selected for a special section, the selection being based upon excellence in laboratory work, as well as performance in the recitation. Although a few of the twenty-eight were selected because the school's schedule would not permit of their taking the work at any other time, this plan, for the most part, placed together those who were particularly capable, and kept in the other sections those who for any reason would retard the progress of the strong.

In selecting the work for this section I was not anxious, particularly, to teach more of chemistry, but I wanted to use chemistry as a vehicle in bringing out two things; a development of that part of the mind that science serves best to cultivate and strengthen, and an increase in skill in the use of the hands. So far as the text-book work was concerned, that could not be materially different from that of the other three sections; for I was dealing with beginners, still unfamiliar with some of the basic principles of chemistry. In selecting the laboratory work, however, there were at least three possibilities: I might continue the work of the first semester, and embellish it, so to speak, with work such as was given last year in School Science and Mathematics in its department called "Live Chemistry;" or I might carry on some

of the ordinary experiments of the second semester, and also introduce the subject of qualitative analysis. A third possibility was preparation work. The nature of the preparation work, I shall speak of later.

My objection to doing work of the same nature as was carried out in the first semester, was that the experiments are so quickly done and so alike in character that they fail to arouse enthusiasm in the student, or to leave any vivid impression upon his mind. My objection to introducing the experiments of the so-called "Live Chemistry" was that they were not needed to arouse the student's interest and they were for the most part informational and not closely enough related to the basic principles of chemistry. My objection to qualitative analysis, coupled, of course, with the ordinary experiments of a second semester, was that it is one-sided, it deals almost exclusively with the chemistry of solutions and the formation of highly insoluble bodies, and it is well nigh impossible to keep from the student's mind the false idea that the end and aim of qualitative analysis is principally to get the unknowns correct. There is too great danger of the work becoming mechanical.

I chose the preparation work because:

1. I believe it is in accord with the boy's natural development. A real young child as a rule wants to destroy; he creeps to the table, pulls off a magazine and proceeds to tear it to pieces. At the age that we generally get the boy, however, his attitude toward life is diametrically opposite, he wants to make things; and there is nothing in chemistry that is more fascinating than preparation work.

2. The work can be arranged to suit the growing capacity of the student.

3. Each preparation requires two or more hours, and at the end there is something definite, something tangible, neatly put up in a sample tube. This, it is my belief, leaves a more vivid impression than the test-tubing that is sometimes done.

4. The work serves best as an introductory course because it covers a wider field of reactions. Varied types of chemical change are illustrated, both those in the furnace and those in solution. In solution advantage is taken not only of high degree of insolubility, but also of differences in solubility among the more soluble bodies, as well as differences in the effect of temperature on solubility.

5. The work develops chemical technique, because the student learns to use something more than the Bunsen burner, test-tube, beaker and ring stand.

6. The work sticks to the fundamentals, and at the same time satisfies the clamor for the practical; for the greater part of the preparations selected are of industrial importance, and for the starting point of each, either natural products or crude manufactured materials are used as far as possible.

In order that you may get some idea of the nature of the laboratory work done in this special section, I shall describe some of the experiments. Before starting the work, I examined all the experiments commonly done in the second semester, and cut out all those which in my judgment were little more than "fillers." By a "filler" I mean an experiment which is put in the semester's work not so much to keep the student progressing as to bridge the gap from one chapter to another.

The place where we begin in the second semester, at Central, is with sulphur. In connection with that element I performed at my desk those experiments which I thought the students should see performed but need not necessarily do themselves. This saved a good deal of time. The students prepared two compounds of sulphur; one, sodium thiosulphate, and the other, yellow ammonium sulphide. The first compound was chosen because it was an important commercial product, and because its preparation is an excellent experiment for bringing out the fact that chemical reactions do not always run in the way that the book indicates, in other words, that the worker must control the conditions. Two or three students tried short-cuts, and ended with a mixture of the sulphides of sodium instead of sodium thiosulphate. This necessitated the repetition of about three hours of work. I had yellow ammonium sulphide prepared because many of the students will later study chemical analysis, and I wished them to get, at first hand, some knowledge of the nature of that valuable reagent.

We could not do very much with the halogens because of expense. However, I did have the students make some potassium chlorate, starting with wood ashes as a source of the potassium. While this preparation of potassium chlorate is not the modern one, I am not sure but it was about as instructive as any experiment that the students did, and possibly we shall all have to make potassium chlorate this way if we are not already supplied for next year. Potassium chloride, formerly bought for sixteen cents a pound, is now practically unobtainable. I had the students prepare potassium perchlorate, so that they would have impressed upon their minds that the equation that they learned when they prepared oxygen last September did not tell the whole story of what happens when potassium chlorate is heated. I believe that it is a good idea, as the students' knowledge grows, to go back and take up some of the earlier parts of the course from the standpoint of their new knowledge.

In regard to the alkali metals, we prepared potassium nitrate and pure sodium chloride. These two preparations, alone, teach more of the chemistry of solutions than four weeks spent on qualitative analysis. This is particularly true if one insists upon obtaining potassium nitrate that gives no precipitate with silver nitrate and no yellow coloration in the Bunsen flame. We also prepared sodium carbonate; this preparation serving as basis for the discussion of the local Solvay process.

Among other preparations, we made nitrides, and in this connection the growing necessity of obtaining nitrogen from the air was discussed, as well as the methods of obtaining it in Norway, Sweden and Germany, and in the United States. I know of no more striking illustration of the use of theory and mathematical formulae in the production of practical results in chemistry than is afforded by the work of Haber in the synthesis of ammonia.

The result of this segregation, based upon ability, has been very gratifyin. Never have my students seen so clearly the close relation between chemistry and their daily lives, and between chemistry and commerce; never have so many asked about books in the library that would make profitable reading; never have so many inquired as to the possibilities of a career for them in the field of chemistry.

I am sure that if the schedule of the school will in any way permit of it, segregation of students, based upon ability, should be attempted by all means. It is our patriotic duty to do this. The country does not need the average fellow; it needs leaders. We, as teachers, should ever be on the look out for the bright mind. In order to let such a mind forge ahead, and become educated away from mediocrity, we must stop placing the strong and the weak in one line and marching them through the semesters in lock-step formation.

APPLIED HIGH SCHOOL CHEMISTRY FOR GIRLS.

MR. J. S. BROWN, CENTRAL HIGH, DETROIT.

It is somewhat with hesitancy that I appear before you this year on a subject so closely related to the one I gave last year at this time. When I was approached on the subject I gave all the excuses that I could muster to the front at that time, but none of these seemed to be able to satisfy our imposing friend, so it seems that you are again subjected to a short period of punishment. But I shall assure you in the beginning that I am very much in the same position as the Ambassador of China when called upon for an after dinner speech at a banquet in Washington. He said, "Gentlemen, what I shall say to you will be very much like the bark of a dog—that is, largely noise with perhaps little to it; but on the other hand, I do assure you that it shall not be like a cat's tail, fur to the end."

In justice to myself I should perhaps state that I have not been able to give this subject as much thought during the past year as I had been paying to it heretofore from the fact that I have been thrown in with other fields of work that has utilized my time to a very large degree.

In developing this work our aim was to keep in mind the greatest good to the greatest number in our classes. In introducing this applied work, we

did not lose sight of the fact that we were teaching the subject of chemistry; and the aim was to weave in this applied work and make it a part of the subject matter we were actually teaching.

Since the development of chemistry and chemical principles have a more or less uniformity which are varied by the individuality of the one presenting them and the various methods set forth by the different tests in use, I shall not take your time to mention anything along that line; but proceed to certain phases of the work that has been introduced into the girls' classes during the second semester.

To my mind the part of chemistry that offers the greatest opportunity for development in a class of girls is that part of chemistry which deals with carbon and its compounds. There is ample material in this subject so that the average teacher could very profitably spend one semester on this part of the text. The opportunity for practical application on this part of the subject is only limited by the efforts of the teacher. Since this is true it certainly seems unfair to the pupil that more time and effort cannot be spent by the teacher on this part of the work.

After the introduction to the chapter on carbon is completed, it seems to me the natural thing to be taken up is natural carbonization, beginning with the generally accepted equation for the formation of plant tissue. Here, the storing up of energy is *the* important thing to be brought out, noting also the fact that the same reaction, as to the constituents involved, holds for the formation of cellulose, starch, and the various kinds of sugars. The plant tissue upon dying drops to the ground and is gradually changed to nearly pure carbon. The conditions necessary and the various changes can be easily followed by the pupil. The point now to be emphasized is that carbon is important to us from the fact that the energy necessary to form the plant tissue can now be set forth in the form of heat; and this is utilized in every phase of the industrial world. The pupil will readily see in this that you have a complete cycle of carbon dioxide. The laboratory preparation of carbon dioxide and a study of its properties can now be taken up, following this with the relation of carbon dioxide and oxygen to plant and animal life, again emphasizing the reaction for the formation of plant tissue. This gives us starch and sugar with which to work out the complete process of fermentation. In this the student should trace the changes that take place and give formula of the products formed as far as practicable. From this study the application is made to the baking of bread, noting all the physical and chemical changes that take place. This process is also applied to the manufacture of beer and distilled liquors. In this work the teacher is given the best opportunity he will have in the whole course in chemistry of showing the action of ferments or enzymes. The study of enzymic actions is becoming so important the pupils should not be allowed to complete their work in chemistry without having heard something of them and fermentation cannot be properly understood without their action is brought out. Since the bak-

ing of bread is closely allied with the baking of cakes, this will be the next subject to follow. The three different classes of baking powder are taken up, the composition of each class, the chemical reactions of each, the posible physiological effect of each, and the result of the government investigation on the effect of alum baking powder on the human system. Baking soda is now taken and studied from the standpoint of its composition and chemical reaction. The difference between baking powder and baking soda is then considered, and the function of each in cake baking. The relation of carbon dioxide to soda water and various other soft drings may very profitably be considered here; and, also, the construction of a certain class of fire extinguisher. Since fermentation is closely related in many ways to digestion, some work on food study may be suitably put in at this point. The work I have given to my classes is something along this line. I first aim to have the class know what we mean by the term food, then classify the different food stuffs and relate these different classes to the needs of the body. The method of calculating food values is then taken up and the calorific value of the different classes of foods considered. The readiness with which the different classes of foods are digested and absorbed by the body are now given to the class, and from this the physiological calorific value of the different foods are found. The needs of the body both from the standpoint of physical labor and mental work are loked after, and these needs related to the amount of each class of food that should be eaten by the different individuals. It seems now suitable to bring in the influence of cooking on foods. This work is now followed by the digestion of foods, considered from the physiological chemical standpoint. Starting with the digestive action of the mouth on foods, I mention the salivary glands in relation to the saliva, take up the composition of the saliva and its digestive action on the different classes of foods, and consider the different functions of the saliva and conditions effecting the action of the ptyalin. The food is traced through the stomach, intestines, circulatory systems, liver, into the various parts of the body where it will be needed. The secretions with their origin and composition, the digestive action of the various fluids with their active constituents and the chemical change produced by them, the different ways of absorption, and the oxidation in the tissues or the change into bodily tissue are everywhere considered. Since an enzymic action takes part in each chemical change of the foods, by the time you have reached the above point, the pupils have some conception of the importance of enzymes in practical life. At this time the evil effects arising from excessive use of the different classes of foods are carefully emphasized. We are now ready to take up the menu study with the pupils. From tabulated forms the pupils compare their daily rations with one that is in accordance with the daily requirements of a person in their station in life, and, then, make out regular bill-of-fares in accordance with the above instructions. As laboratory experiments accompanying this work, the pupils work out the tests for starch, sugars, and pro-

tein. Since cellulose is closely related to starch, the action of acids, alkalies and washing powders is considered on the various textile fibers. To this may be added work on cleaning of fabrics, blueing and dying. The alkali metals are also taken up carefully in their relation to the manufacture of soap with suitable laboratory experiments. An outline of the chemical changes taking place in the manufacture of soap, the chemical action of soap in cleansing, and the cleansing power of soap are all carefully considered. The alkali earth metals are considered in their relation to the manufacture of glass, mortar and cement, also to water softening, fertilizers and disinfecting. The making of blue prints and photography from the chemical point of view can also be added, to the delight of the pupils.

The above subjects have all been worked out and given to our class by different members of our chemistry department. I am sorry however that each class could not get it all in full; but time compelled us to omit part from each class so the part omitted depended upon the time and the individuality of the class under consideration.

To my mind chemistry should not be made an informational subject. When an application in chemical principles is made it should be dwelt upon so the pupils will see the relationship it is intended to bring out. When this is done you are developing a scientific method of thought which is one of the important functions of this subject. When one sees it is only possible to carry this out in such a limited number of lines when the whole world of material is at our feet, you can't help from feeling there is a gross injustice done to the girls who wish this work. When the practicability of this subject and the close relationship to home and home life is considered, it seems to me it is vastly more important than many other subjects pursued by quite a number of high school students.

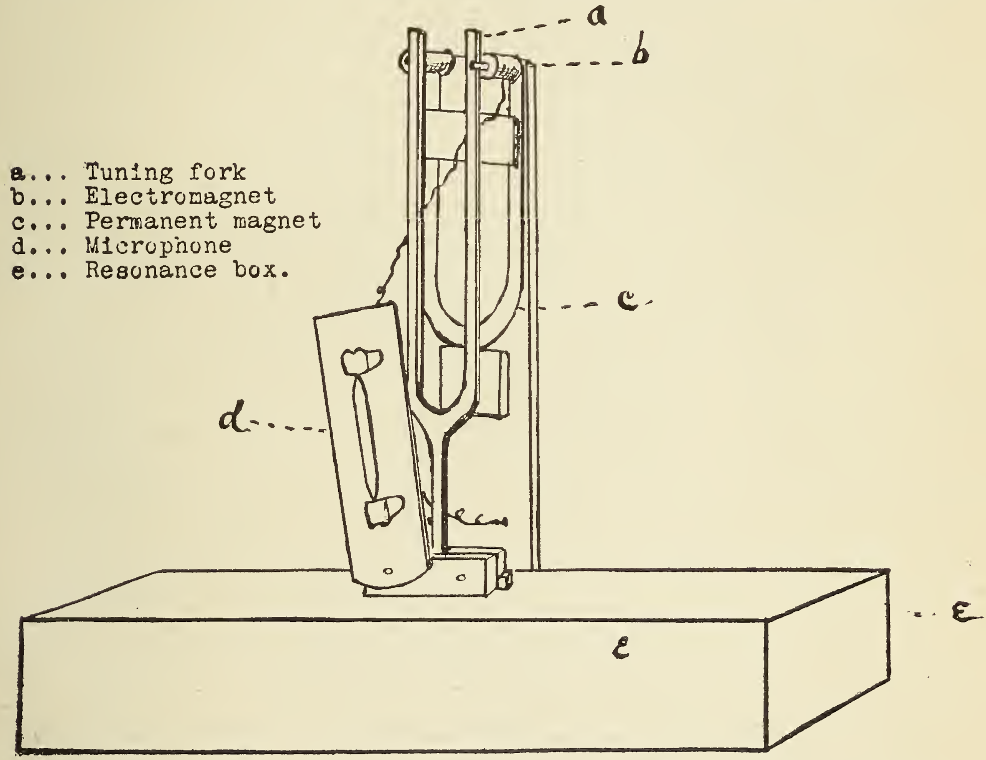
In this brief treatment of the subject I have omitted many applications that are taught and followed up by laboratory experiment and found equally interesting in both girls' and boys' classes. The flexibility of the subject also makes it interesting to a wide awake teacher. The field of chemistry is the great world before you, and the applications of this subject are practically unlimited. Shall we be content with what we can crowd into our present allotted time, shall be teach applications before we have given them the foundations for the applications, or shall we endeavor to advance along both lines? If we prefer the latter how about the question of time? I realize fully well there is an administrative side to this question, and our friends in the physics department can advance the same arguments; with them we have no quarrel; but this still leaves our question unsolved. With this I shall leave it with you.

A MICROPHONE-CONTROLLED TUNING FORK.

MR. N. J. DROUYER, YALE, MICH.

This demonstration related to the performance of a tuning fork of about 64 vibrations per second. The vibrations of the fork were sustained electrically by the arrangement of an electromagnet and microphone as shown in the figure.

The resonance box is about 20 x 8 x 4. The microphone is put in series with the battery and the electro magnet shown in the drawing. The fork

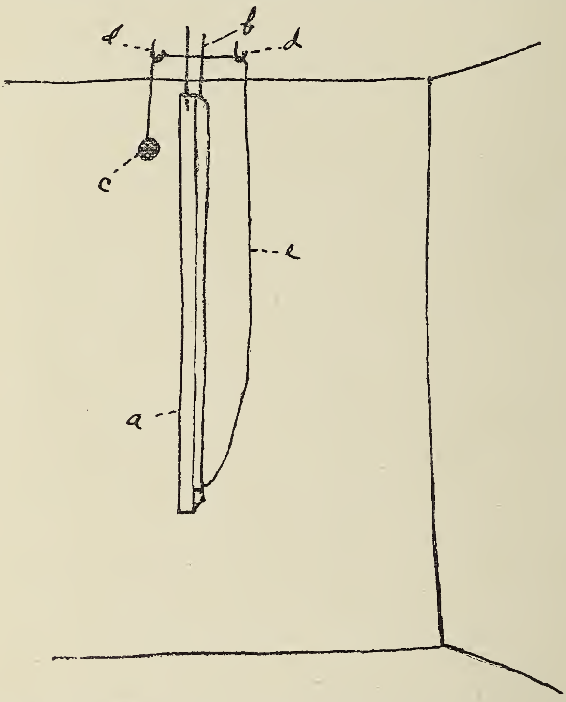


will vibrate on two or three dry cells and continue to do so until the battery runs down. The fork is mounted on the resonance box with its upper end between the poles of the electro magnet and vibrates there from the influence of the magnet. There is no metal contact with the fork at any point. When the fork is set in vibration, the box vibrates in unison with it, and the microphone is set into synchronous vibration, thus causing the strength of the current to vary from the maximum when the contact is good to the minimum when the contact is very poor.

DAVIS' FALLING-BODY APPARATUS.

MR. F. M. LANGWORTHY, ALBION.

There are three distinct kinds of laboratory apparatus. There is the complicated and expensive which is unsatisfactory in the hands of the pupil who has never had any experience in handling machines of any kind. Then too at the other extreme there is the crude student-made apparatus which is unfit for the exacting work for which the physical laboratory should always stand. Between these two extremes there is the practical medium-



priced, yet simple apparatus that is well adapted to the average eleventh or twelfth grade high school student.

The Davis' Falling-Body Apparatus answers well for a medium-priced equipment. It is simple yet very accurate for determining g, the pull of gravity. The Atwood machine for this purpose is too complicated and is out of order a good share of the time unless the instructor gives personal attention to this experiment at all times. We find that the "up to date" manual does not include the Atwood machine in its equipment. The old incline plane is too crude, and the results by students are so inaccurate, that it is not used for determining g in the modern laboratory. The pendulum alone is a

good apparatus for determining g, but it has this one defect for this purpose, —the student is looking for something to fall, and nothing falls. It is not real enough. Though accurate, it is remote in its application.

Davis' Falling-body Apparatus combines the pendulum with a really falling body utilizing the teaching value of each. This is known by another name, being originally used by an instructor in Harvard University. Davis' improvement on the original, places it among the practical equipment.

It consists of a strip of an inch board two inches wide, which is not less than two meters long, hung as a pendulum from the ceiling of the laboratory. The width or thickness can be reduced if it is too heavy to be held back by the iron ball which is to fall. This strip can be bought or carefully made in the Manual Training room. The iron ball should be perfectly spherical about the size of an egg with a hole drilled through the center. We use a ten-ounce ball, which can be bought at any supply house. We suspend the wooden strip by wire through a hole made at one end running the width of the stick. We are now ready to perform the experiment. Cut two strips of white paper about eighteen inches long and the width of the wooden pendulum, also two strips of impression paper the same size. With thumb tacks fasten the strips of white paper, covered with impression paper, impression side down, to both ends of one face of the wooden pendulum, so as to record the starting point and percussion point. Fasten two hooks in the ceiling above the wooden pendulum, about three or four inches apart. (See cut). Take common wrapping twine and thread through the iron ball and knotted, then pass the string over the two hooks in the ceiling and then fasten the lower end of the pendulum to a screw eye, placed on the opposite side from the papers. The ball should be pulled up to about the middle of the top impression paper, and should be heavy enough to draw out the wooden penlulum about twenty centimeters. Before letting it swing out see that the ball swings clear of the strip, and that the strip or wooden pendulum swings plumb with the hanging ball. Now pull back the swinging ball and let it fall back upon the impression paper leaving a starting or zero mark on the white paper at the top. Now let the wooden pendulum swing back by the weight of the ball. When everything comes to a rest, burn with a match the string between the two hooks in the ceiling. The ball falls, but at the same time the pendulum is released and swings striking the falling ball where the lower impression paper is fastened. The distance carefully measured between the two impression marks (the starting mark and the impact mark) gives the actual distance of a body falling during the time of a half-swing of the pendulum. Make two trials and average for the known distance. Then time the wooden pendulum with a watch for the number of single vibrations per minute, and calculate the time for half a single vibration and call this (t). Then taking the averaged distance for (d) we can very easily compute for g with the standard falling body formula, viz., $d = \frac{1}{2} g t^2$.

With this simple apparatus, students have many times obtained results as close as 980.8 without the aid of a teacher. The lasting impression of a real falling body, and the pull that gravity has upon it, will never be forgotten.

ELECTRIC OSMOSE.

MR. ALVIN STRICKLER, STATE NORMAL COLLEGE.

Shortness of time will permit only a brief statement regarding this important phenomena and the present theories for its explanation. As early as 1807 Reuss discovered that during electrolysis in a cell with an anode and a cathode chamber, the water rose in the cathode compartment and receded from the anode. In some remarkable way it was carried thru the pores of the membrane. This, in its simplest type, is the phenomena known as electric osmose. The resemblance to osmosis is superficial and far-fetched, for here we have a membrane separating two solutions of the same concentration, while in osmosis the concentration on each side must be different. It is a case of our rather frequent misnomers. "One hardly dare say that one phenomena has nothing whatever to do with another, but electric endosmosis is no more nearly related to osmosis than is the fact that like charges repell each other."

The apparatus used in demonstration are shown in Figs. I and II.

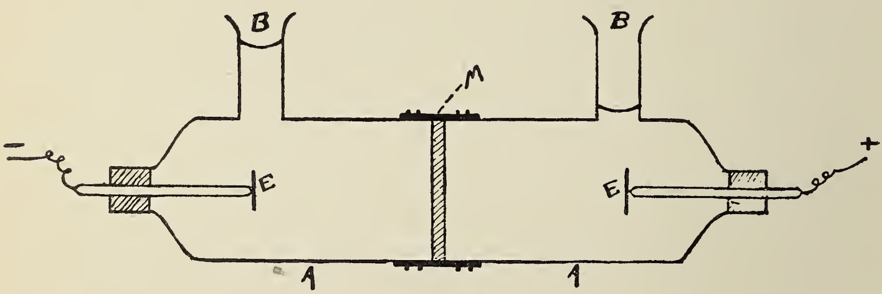


Fig. I.

No. I is made of two bottles (A) with the bottoms cut off and the membrane (M) placed in between, being held in place by a rubber tubing wired on. (E) represents the electrodes. The apparatus was filled with water with the level in B & B^1, the same. Now a current of electricity (220 D. C.) was passed thru the water, causing a rapid rising of the water in B^1 and a lowering in B.

No. II is a little more complex and is known as the overflow type. It consists of a large bottle again with the bottom removed. The membrane in this case is a porous cup (M) and inside of it is the cathode chamber. When filled level full so that (A) just overflows and the same current (220 D. C.) used the water passes very rapidly thru the cup and runs down into the cylinder below.

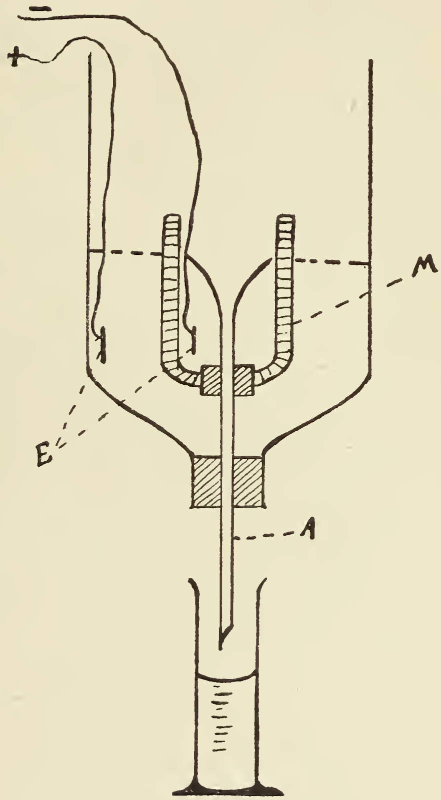


Fig. II.

How is the phenomena explained? It is a recognized fact that whenever two phases are brought in contact there is established a difference of potential and the one having the higher dielectric constant is always electro positive. Let us take the very simple case of porcelain in contact with water. The dielectric constant of porcelain is about 6 and of water about 80, making the latter + against the former —. If then we had a porcelain tube filled with water and passed a current of electricity thru; the water

would be drawn toward the cathode. But if the tube were filled with turpentine, which has a dielectric constant of about 3, the flow would be reversed.

In the case just cited, if the porcelain were suspended in the water, it would migrate in the opposite direction. Also if we now place the porcelain in the form of a membrane separating the two chambers it becomes fixed again, allowing only the water to move.

Much work has been done with colloids which are in the nature of very fine suspensions and they can be divided naturally into two classes, depending upon the direction of migration. Those which assume a — charge and migrate toward the + pole are called "positive colloids" and those which go toward the — electrode are called "negative colloids." Some have also been found to be neutral, but can be made to migrate by adding an acid or base which by adsorption causes them to assume a charge. Such colloids are albumen and pepsin and this property is used for their commercial extraction.

So far the explanation has been very simple, but we find that electric osmose occurs also with "true solutions" of both electrolytes and non electrolytes. With such, a great many difficulties arise. Non electrolytes are carried thru the membrane unchanged. When a current of electricity is passed thru an electrolyte it is broken up into + and — ions which migrate with varying velocities toward the — and + electrode respectively. The placing of a membrane between the chambers does not affect this phenomena but other factors enter in.

The membrane in contact with the solution at once assumes a charge which will exert its influence when the current is passed thru. It also has the power to adsorb the ions to a greater or less degree, selectively, thus attaining a charge which may partially neutralize or augment the former. The ions moving with different speeds may tend to pile up on one side of the membrane also affecting its charge. So the problem becomes very complex, but could still be explained, it seems, by an electrification of the membrane.

Nor do salt solutions always act normal. Ordinarily the osmose is toward the cathode, but only when sufficiently dilute. If the concentration is increased the movement becomes less and less until finally it ceases and then moves in the opposite direction. But the concentration at which this occurs is not the same for each solution as the disturbing factors, as cited above, must be different for each pair of membrane and solution.

Using a three and four compartment cell, the solution has been found to show varying results. Sometimes it flows to the cathode, other times to the anode and sometimes even toward or away from both electrodes at the same time.

We see here then a great field of investigation opening up with, I sincerely feel, a wide range of commercial possibilities.

USE OF THE AUTOMATIC SPRINGLESS BALANCE IN CHEMISTRY.

MR. B. J. RIVETT, DETROIT NORTHWESTERN HIGH SCHOOL.

No doubt many science teachers read the article in the January number of the "School Science and Mathematics," by Dr. Sieg on this subject. He was the first person to suggest the use of the automatic balance in laboratory work and he advocated its use in the physical laboratory chiefly because of the great saving of time in weighing.

Thinking that this balence might be a boon to chemistry laboratories I called on the manufacturers and they kindly loaned me two balances to test in my laboratory. One balance has a capacity of 1500 grams and the smallest graduation is 5 grams; the other has a capacity of 500 grams and the smallest graduation is likewise 5 grams. I asked Mr. Theodore Wagner of our physics department to test the 1500 gram balance in his laboratory and I tested the other in the chemical laboratory.

Briefly my conclusions are as follows: The balance as constructed is not suitable for accurate work in elementary chemistry. It does very well for rough weighings of 5 or 10 grams, but many experiments require readings to one-tenth of a gram. If the manufacturers can modify the balance so that it reads to a tenth of a gram, I believe it will become a necessity for rapid weighings in our laboratories.

Mr. Wagner reports that the balance is admirably suited to laboratory work in physics. Weighings may be obtained in a few seconds and the results are as accurate in density and heat experiments as those obtained by the beam balance.

LIST OF LABORATORY EXERCISES IN PHYSICS FOR SECONDARY SCHOOLS.

MR. R. V. ALLMAN, DETROIT CENTRAL.

This list of experiments is compiled mainly for the purpose of suggesting to physics teachers, a list in which a number of new practical experiments are incorporated with the older standard experiments. As the demand of modern physics for practical experiments seems increasing, it becomes necessary to acquaint ourselves with the best of those presented to us, and to this end I have welcomed the advice of friends with experience.

Especially in the laboratory work for girls do we find in some schools decided changes in the experiments presented. Prof. Greene of Albion

College, who offers a course in "Household Physics" which is meeting with decided success, was kind enough to suggest for this paper as being highly interesting and practical experiments, several of those under the head of "Special Experiments." He lays especial stress on the experiments involving cost and efficiency tests of electric cooking utensils and household appliances. As girls are quite generally interested in music he suggests experiments on the relation of pitch to the length of an organ pipe, or one showing the relation between pitch and length, diameter, and tension of a piano wire. (Melde's Experiment).

The Weston Instrument Co. of Newark, N. J., is putting out a set of monographs containing some very interesting and useful information which they are glad to furnish to any physics teacher on request. These monographs contain a large number of practical electrical experiments such as cost and efficiency tests, fuse testing, photometric measurements, electroplating, that are decidedly valuable.

I have had the advice and assistance in the preparation of this list of Mr. Cook of Cass Technical H. S., Mr. Wagner of Northwestern H. S., and Mr. Sickley and Mr. Vaughan of Central H. S. We present this list, not as a fixed arbitrary list, but simply as a suggestion of experiments that can be performed in any ordinary high school, realizing that the list must be varied to suit the conditions in each school, depending on the limitations of the apparatus or the character of the school.

List of Laboratory Exercises in Physics for Secondary Schools.

Mechanics.—(Starred experiments are required.)

1. The Meter Stick.
*2. The Vernier.
*3. The Micrometer Screw.
4. The Beam Balance.
*5. The Jolly Balance and Hooke's law.
*6. Density by mass and volume.
7. Uniformly Accelerated motion.
*8. Composition of Concurring Forces.
9. Composition of Parallel Forces.
10. The Pendulum.
*11. Moment of a Force.
*12. The Inclined Plane.
*13. Pressure in Liquids.
14. The Barometer.
*15. Boyle's Law.
16. Principle of Archimedes.
*17. Determination of Specific Gravity by principle of buoyancy.
18. Determination of Specific Gravity by Pyknometer.

Sound.

19. Vibration rate of tunings fork.
*20. Velocity of Sound in Air.
21. Velocity of Sound in Metals. (Kundt's tube.)
*22. Law of Vibration of Strings.

Light.

*23. Measurement of candle power of a lamp.
24. The Plane Mirror.
25. Index of Refraction of Water.
*26. Index of Refraction of Glass.
27. Refraction by a prism.
*28. The Concave Mirror.
*29. Focal length of a lens.
30. Wave length of Light.

Heat.

31. Testing a thermometer.
*32. Coefficient of Linear Expansion.
*33. Determination of Specific Heat.
*34. Heat of fusion of ice.
35. Heat of vaporization of water.
36. Vapor Tension.

Magnetism and Electricity

*37. Mapping a magnetic field.
*38. The Voltaic Cell.
39. An electromotive series.
40. A study of electromagnets.
*41. Joining cells.
*42. Ohms law.
43. E. M. F. of cells.
*44. Resistance of coils.
45. Resistance and E. M. F. of cells.
46. Current Induction.

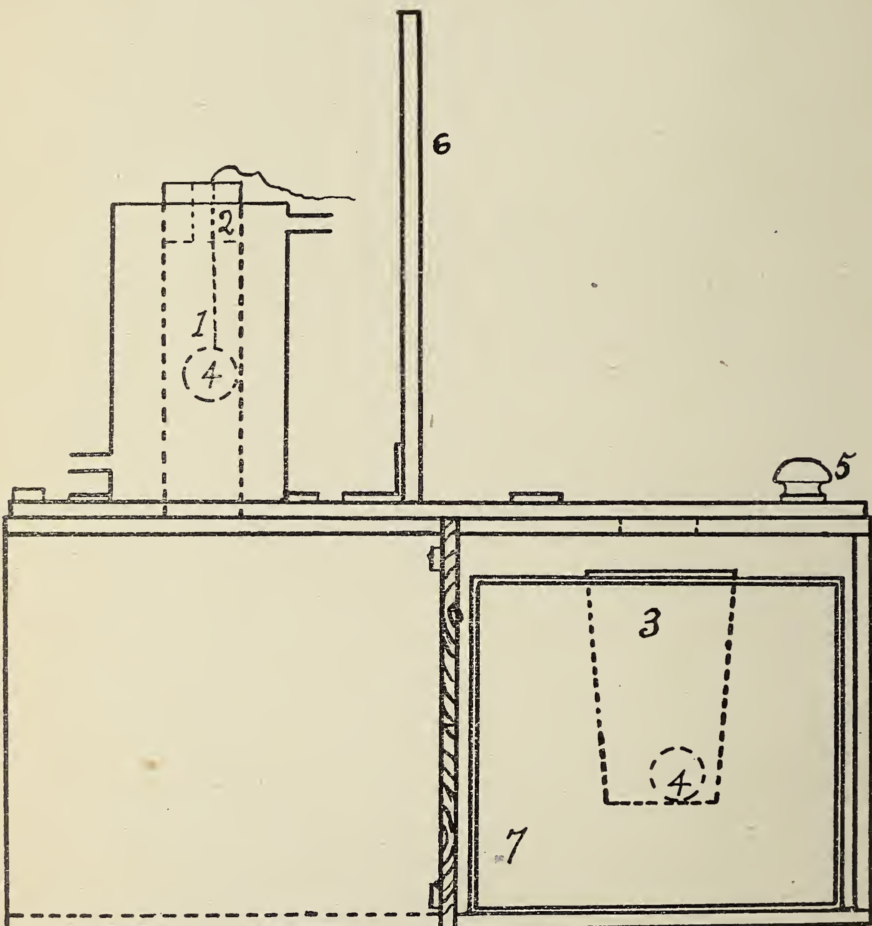
Special Experiments.

47. Cost of preparing a meal by use of electric stove.
48. Cost per minute of electric toaster, iron, vacuum cleaner.
49. Efficiency tests of electrical instruments.
50. Determination of quality of milks by density.
51. Study of relation of length of organ pipes to pitch.
52. Cost of Incandescent lamps per hour.
53. Test of fuses.
54. Determination of Mechanical Equivalent of Heat.
55. Distribution of Current, Voltage, and Power in a Model Lighting Circuit.

CALORIMETER FOR DETERMINING THE SPECIFIC HEAT OF METALS.

MR. H. A. DAVIS, PORT HURON.

This device consists of a divided box with sliding top, as shown in the accompanying diagram. Mounted on the sliding top is a double-walled cylinder, in which the metal is held whose specific heat is to be found, by



means of a thread suspended from the Cork 2 through which a thermometer is placed for determining the temperature of the heated metal. While steam is being passed around the cylinder to heat the metal ball, the water equivalent of the Calorimeter 3 is found by the method of mixtures. Next,

a known amount of cold water is placed in the Calorimeter, its temperature is taken by means of another thermometer and it is placed in the small box 7, with which it comes in contact around the rib only, thus reducing the radiation effects to the minimum.

The sliding cover 5 is now drawn along the top of the box until the hole in the cover underneath the steam heating cylinder coincides with the hole in the box directly over the water in the Calorimeter. The temperature of the heated ball is read on the thermometer and the metal ball is then lowered by means of the thread through the hole into the Calorimeter, after which the water is thoroughly mixed and the final temperature is taken. From these results one is able to determine readily the specific heat of the metal. I have found in working with this apparatus that it is easily understood by students, and that they are able to obtain some very accurate results. I think it shows to them in a very clear way that the heat lost by the heated metal equals the heat gained by the water and the Calorimeter. I believe that a box constructed on the above plans, but made of asbestos board would be found better than this one.

If there is anyone who is interested in this device, and has not already seen one and will write to me, I will be glad to furnish them with detailed information as far as I know.

PHYSICS FOR GIRLS.

H. E. HAMMOND, KALAMAZOO CENTRAL HIGH SCHOOL.

When the protective tariff on Physics (in the form of a University entrance requirement) was removed a few years ago, we had an immediate opportunity to see just how well the subject could stand on its own feet, for at Kalamazoo it is, and was, an elective subject, the only forced choices being those imposed by entrance requirements. The result was an instant drop of about 30% in the number of elections and that diminished figure has been somewhat reduced since, though there have been large fluctuations. Similar decreases have been noted in other subjects too, 12th year English, 12th year mathematics, and Latin too, Greek having long since disappeared. We find large numbers of our seniors elect back as far as the rules will let them and especially does this seem true in science. In Physics the chief decrease lay among the girls, i. e., from nearly 50% of the total taking the subject down to a bare 20%.

We have attempted to find reasons for such a drop and the following seemed most prominent.

First and foremost, the subject had a fearful reputation for extreme difficulty and dryness: we must admit it has not been entirely undeserved.

This meant that there were difficult problems, incomprehensible language, and this about things nobody ever heard of outside the Physics class room or laboratory, long laboratory hours, much note book work, and nothing interesting, nothing but weighing and measuring in the laboratory.

Second, for those not going to college, there was thought to be no informational, let alone practical value in the subject as taught, an objection which is naturally a corollary of the first.

Third, there was difficulty in finding a place for science among the senior elections after the girls had decided on their future lines of work; as History-English or Latin-German-French; especially if they find themselves lacking credit to meet some requirement. This difficulty hits a good many and we can only combat it indirectly.

As to the first set of objections. We Physics teachers know that the subject is popularly considered very hard. I know that the summer before I took it was made very miserable for me by tales of the horrors in prospect, horrors which I found did not exist as they were painted. We teachers know too that the problems should not be found as difficult as they are but it does little good to blame the mathematics teachers. In our school the Gary program makes long laboratory hours, with their multitudinous repetitions of a single measurement impossible. I think the amount of required note book work is not excessive, and in this day there should be no reason, except extreme poverty in equipment, to prevent having some live laboratory exercises.

It seems to me, personally, that there are two big reasons why the subject is dreaded by the girls and these are partly under our control. The first is that Physics cannot be very successfully studied by the rote memory method, a method which many girls rely upon entirely. When it fails to get them the A's they win in other subjects, they become discouraged at once. This is very difficult to combat for we have the habits of many previous years to upset, but we should endeavor to teach them how to study in different ways, to cease to regard the book as the ultimate source of all truth and above all to use a little observation and common sense.

The second difficulty is that of incomprehensible language about a host of things of which they have never heard. It is almost useless to urge the dictionary upon them, for most students seem never to think of it as a help but an imposition and, moreover, its definitions are so frequently almost the same as those of the book itself. The trouble lies, of course, in the fact that girls bring to bear on the subject vastly different previous experiences from the boys and most of our texts are written in boy language. Girls are generally quite ignorant of the names of mechanical parts, even such terms as shaft, valve, crank and gear mean nothing to them in many cases. In class they hesitate to show their ignorance before the boys and many foolishly fear low marks if they ask such questions of the teacher outside of class. So in only too many cases the girl goes on unhappily trying to mem-

orize the text and all the time rebelling against the "stuff" and spreading the gospel of "don't take it" among her friends. The same is true in laboratory. Too much work is done in mechanical, cook book fashion with seldom an insight into the problem, and, after the initial interest of handling apparatus has died out, with more inward rebellion.

My experience has also led me to believe that ignorance of the meanings of maps and diagrams is more widespread than we sometimes suspect and thus we are deprived of one of our greatest teaching assets with many students.

A consideration of these facts led us to feel that we might find some help in an altered content, altered not so much in what was covered as in the placing of the emphasis. The remedy is no new one, it is being worked out in many places and advocated in others, but it is one that I must admit would be almost out of the question in a small school. The statement made on this floor a few years back by Professor Guthe, that he did not care how we taught Physics or whether we taught it at all, helped on our decision to offer two courses with different ends in view. One, the regulation course, we called Preparatory, for it was its aim to prepare students to take up college Physics, and the other we called General, for want of a better term. This latter is especially for girls though not closed to boys, who are, however, urged to take the other if they have college in mind. We use a different text book entirely, a relatively new one, a book with many faults, but which comes nearer to my ideal of the subject for girls than any other I have seen. It has been in use with us only one year but has been quite successful and I hope to see the experiment succeed further.

Instead of the traditional opening, it begins with Heat and gives a much longer time to that than is ordinarily done. The familiar coefficients of expansion, calorimetry, etc., are there but rather in the background, to be used rather than to serve as the excuse for redetermining them on the part of the student. They are followed by a large number of applications of the principles involved. Heat transmission is studied in connection with its uses, not a paragraph or two of them but ten pages and over. These examples are quite characteristic of the chapter and I never had a class take hold of the very important subject of Heat in a better way. It called out their own experiences. I believe that while the teacher may point out applications, the student gives his main attention to the text and forgets the outside portions to a large extent unless he is driven to make a note book of them. Moreover, very few students recognize applications of the principles when they see them, unless specifically pointed out. The applications should be made in the text itself and if they crowd out some formula derivations let them do so for our students who will never take up college Physics.

In our laboratory work we were, of course, forced to use our old apparatus, but the pupils seemed more interested in finding out that an aluminum rod expanded almost twice as much as an iron one and more than a

copper one than in supposedly accurate determinations of the expansion coefficients as such. Specific heat was treated in the same general way. Rough tests were made of conductivity and then we tried to apply all this material to the problem of what metals to use for cooking utensils, among other things. Relative radiating powers of black and bright vessels were tested, supersaturated hypo solution was used to show that heat of fusion is given out on solidification and that the term does not apply to water alone. The old chemistry experiment of double distillation of fermented molasses showed that solids may be eliminated and liquids of different boiling points separated by this process. They froze water by evaporating ether, they found how much water there was in the atmosphere of the class room and put an equal quantity in a jar to actually see it. They also explored the forced draft heating system of the building and wrote it up. No originality is claimed for this for you see it is in general much like the usual class room demonstration experiments. They may seem silly and of the wish water variety in comparison with the traditional problems, but in this course our effort is not to train embryo specialists in the subject but to try to get over some really useful and interesting information. I believe that the students in this course could handle the non mathematical phases of the subject fully as well as those from the other course and in many cases better. Figures were not barred from the course by any means but the effort was made to make them deal with real home problems rather than just book problems.

The subject of Light came next. Here we put the emphasis upon image formations and their applications in optical instruments, on photography; elementary color, etc., rather than upon the determination of indices of refraction or of focal lengths as such.

In the following chapter on Sound, our apparatus held us down. Here we proceeded in quite the traditional way, and in fact in this particular topic there is not so much to criticise in the traditional way of handling.

Electricity and Magnetism have occupied this first half of the second semester. We rushed through electrostatics very rapidly, spent no time on parallel currents as such, none on the Wheatstone bridge, very little on theoretical action of the dynamo or motor or induction coil, but quite a bit on study of switches, fuses, bells, household appliances, electrolysis and electroplating, lamps and their consumption rates and how to estimate electric bills.

Mechanics remains and for it we have about one-third of a semester. As this year is experimental and my plans are not fully matured on this chapter, I prefer not to speak of them now except to say that I do intend to go light on density and specific gravity, accelerated motion and absolute units of force and work. In fact I want to make the work answer the question "how" rather than "how much." I think we can rely on the girls to be interested in learning how things go but I do not believe they have the same interest in quantitative measurements that the boys have.

In all this remember I am not attacking the traditional course on its own ground, that of preparing students for college Physics, but rather as a course for everybody. So in general, it is my hope to make this really worth while subject have much more interest for the girls. I believe we must do it or else they will gravitate to other and supposedly more valuable subjects as soon as they have free choice in the matter. If we can give courses like the one I have in mind as my ideal, we shall have answered one big objection to our present high school curriculum, for all the practical subjects for home use are not given in manual training departments by any means. The subject itself is all right, the principles are largely settled at least for everyday use, the problem is where are we going to place the emphasis and are we going to put it in the same place for all students. When we have answered that question, we shall have to settle the details of the courses each for himself and for his own locality.

A TRIGONOMETRIC FUNCTION INDICATOR.

(In the Physical Laboratory.)

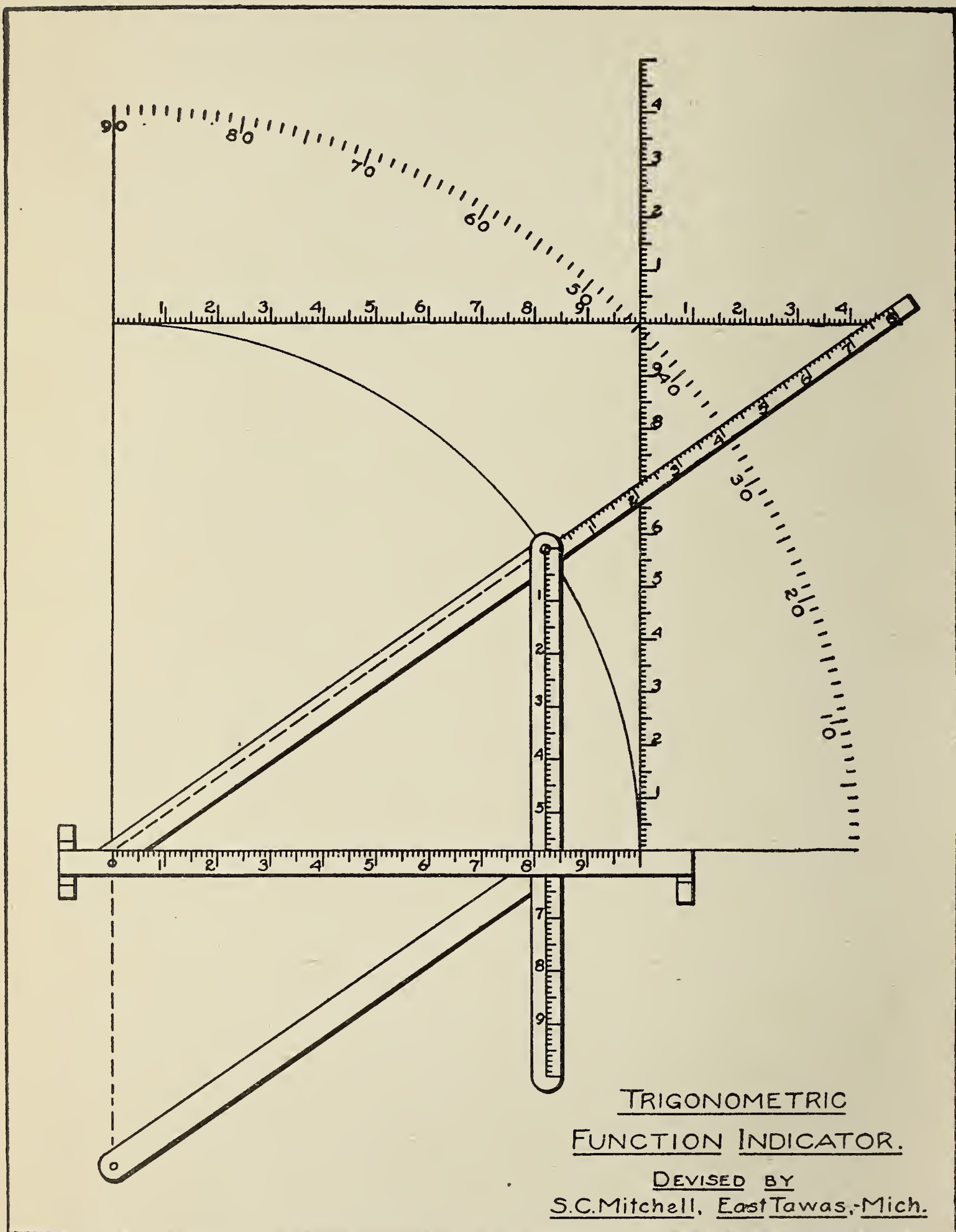
MR. S. C. MITCHELL, EAST TAWAS.

In laboratory classes in High School Physics it is advisable, in some cases at least, to place, at the disposal of the students, the simple principles of plane trigonometry. Very often, however, the teacher hesitates to do this because of the fact that a considerable amount of time is required to give him the necessary working knowledge of that branch of mathematics. While this Trigonometric Function Indicator was not, originally, designed for this purpose, it has proved to be a time-saver in teaching the pupil the meaning and use of the natural functions. It is not necessary, at this time, to show how this may be done. One who is familiar with the subjects of Trigonometry and Physics will readily see the use of the device.

It consists of a plane surface upon which is laid out a quadrant of a circle of unit radius. The radius in the "initial" position is divided into tenths and hundredths of the given unit beginning with zero at the center of the circle. Let us call this the COSINE bar or scale. It is raised above the plane for reasons which will appear later but remains in a fixed position.

Tangents are drawn at the extremities of the radii which are at right angles to each other. Each of these is graduated in the same way and has the zero point at the point of tangency. It is evident that they will intersect at their first unit points. They are graduated and extended as far as possible.

The quadrant is divided into degrees as indicated.



TRIGONOMETRIC FUNCTION INDICATOR.

DEVISED BY S.C. Mitchell, East Tawas, Mich.

Attached to this plane surface at the center of the circle, is the generatrix bar. It is graduated, as are the other scales but only on its external segment. At the distance of one unit from the center another bar is attached to this. Let it be known as the SINE bar or scale. This is graduated like the rest with its zero at the point of connection with the generatrix. It is, at least, one unit in length. It is desirable that this scale be always perpendicular to the COSINE scale. In order to accomplish this, a perpendicular to the initial line, at the center of the circle is let fall and at a convenient distance another bar which we may call the PARALLEL bar is attached to the plane surface. This bar is, also, attached to the SINE bar at a distance from its zero point which is equal to the length of the perpendicular. The space between centers on the parallel bar is one unit. We, thus, have a parallelogram formed and since the left side is always perpendicular to the initial line, the right side or SINE bar must be also.

We know that the sine of the indicated angle is obtained by dividing the side opposite by the hypotenuse. Now if the hypotenuse is equal to unity, the reading on the scale opposite (SINE scale) must be the natural sine of the angle. Likewise that part of the initial line included between the center and its intersection with the SINE scale must be the natural cosine. That part of the vertical tangent cut off by the generatrix must be the natural tangent and the same intersection will determine the secant on the geneatrix scale. The cotangent and cosecant will be determined in the same manner by the intersection of the generatrix with the horizontal tangent.

MATHEMATICAL CONFERENCE

ANALYTIC GEOMETRY.

DR. LOUIS ALLEN HOPKINS.

The subject of Analytic Geometry is built directly upon, and brings out new relations between Algebra, Geometry, and Trigonometry. Algebra and Trigonometry furnish the machinery and Geometry assists in strengthening the imagination necessary for the study of this subject. The criticism that I would offer upon the present preparation of students for Analytic Geometry is that their training has been too formal. Analytic Geometry differs from Euclidian Geometry in that it is more flexible, more adaptable. Indeed, I have often wondered if it would not be wise to introduce the elements of Analytic Geometry into the high school. The coordinate system introduced here for the first time might just as well be utilized in the preparatory work. I believe that my experience is typical: I used essentially Analytic Geometry, though I did not know it, when I was a high school student.

The principal objective of Analytic Geometry, however, is not the study of the properties of polygons and conic sections, though these matters are not to be neglected, but the study of the relation between two or more variables. Relations of this sort we call functional relations and Analytic Geometry has as its principal object the study of such functional relations through their graphical interpretation.

When these functional relations involve two variables, we represent the relationship $f(x, y) = 0$, by means of a plane curve and when it involves three variables, $f(x, y, z) = 0$, by means of a surface in space. Thus the student comes more to appreciate the meaning of level lines, lines of equal temperature, etc.

Analytic Geometry also serves to give a setting to the study of the theory of equations. Here we consider one variable as expressed as a polynomial in the other, $y = a_0x^n + \ldots + a_n$. The corresponding curve lends a vivid conception to what we mean by the roots of an equation; and this suggests, as a by-product, interesting methods for constructing graphically the solutions of equations. For example, it can readily be shown that the roots of a quadratic equation correspond to the intersections of a straight line and a circle, and similarly, that simple but effective machinery can be constructed for the solution of the cubic or biquadratic equation when the coefficients are given numerically.

Of course, it is needless to say that Analytic Geometry is the doorway to those higher geometrical realms of Mathematics which occupy the atten-

tion of many investigators today. I do not mean the playful study of the fourth dimension, but the dignified consideration of highly complicated curves and surfaces. This field of research is among the highest products of the human mind and lends to the intellectual and cultural development of the race.

SHOP PROBLEMS.

MR. LEWIS HAYS, DETROIT CASS TECHNICAL SCHOOL.

Before the workman can take up the ordinary problems in the shop a certain amount of elementary mathematics must be mastered and it has been found in our experience with mechanics both in evening and continuation classes that it is better to lay a good mathematical foundation before attempting the common shop applications.

As the ages of our students vary from fourteen to fifty years and their previous schooling from practically nil to graduates of universities the work has to be given out individually in most cases. The course starts with a review of fractions and decimals and the use of the equivalent tables. Any man who has reached the age of thirty without learning these things very rarely, if ever, masters them and we have found it impracticable to allow him to take up our shop courses for he can never become more than a machine operator. The average workman however has had an eighth grade education and needs only a review.

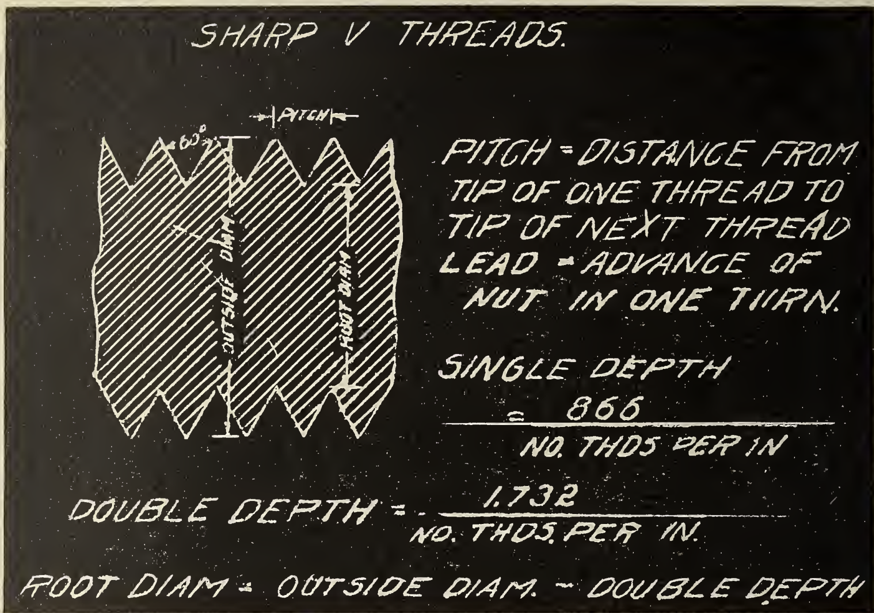
Especial attention must be given to the location of the decimal point. The average student will feel quite chagrined over an error of two or three per cent in a result but thinks nothing of a misplaced point which is far more serious.

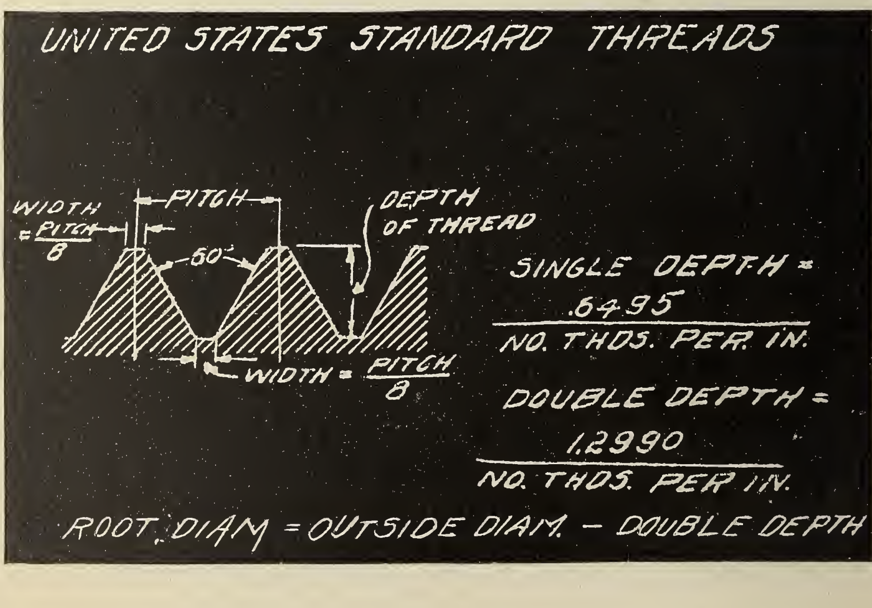
The trained mechanic soon learns to "visualize" problems and he knows from his mental picture which the blue print gives him whether a casting weighs 9.2 or 92. pounds.

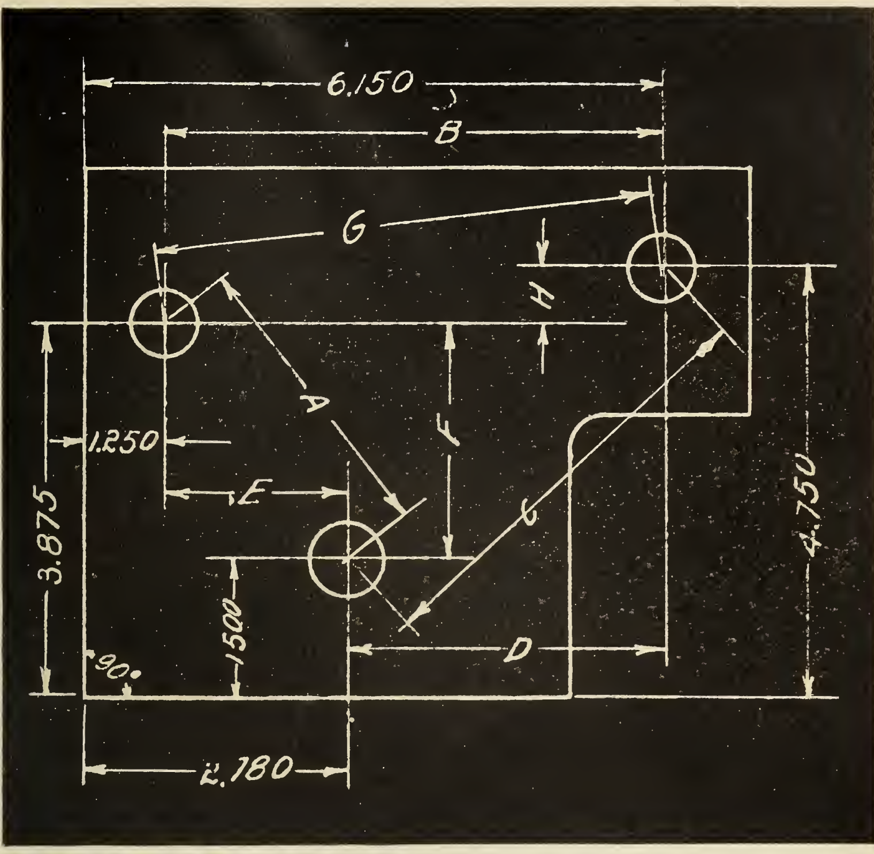
This is a sort of mathematical "Safety First" that we try to develop early in the course.

Square root is next taken up and must be thoroughly mastered as frequent use will be found for it later. The student is asked to extract the roots of few numbers that are perfect squares but is given numbers like 5, 3, 0.75 which are similar to ones met with later.

After square root comes the Pythagorean Theorem which will pull the average mechanic out of more tight places than any other one thing. This is


SHARP V THREADS.
PITCH
60°
OUTSIDE DIAM.
ROOT DIAM
PITCH = DISTANCE FROM TIP OF ONE THREAD TO TIP OF NEXT THREAD
LEAD = ADVANCE OF NUT IN ONE TURN.
SINGLE DEPTH = .866 / NO. THDS PER IN
DOUBLE DEPTH = 1.732 / NO. THDS. PER IN.
ROOT DIAM = OUTSIDE DIAM. − DOUBLE DEPTH


UNITED STATES STANDARD THREADS
WIDTH = PITCH / 8
PITCH
60°
DEPTH OF THREAD
WIDTH = PITCH / 8
SINGLE DEPTH = .6495 / NO. THDS. PER. IN.
DOUBLE DEPTH = 1.2990 / NO. THDS. PER IN.
ROOT DIAM = OUTSIDE DIAM. − DOUBLE DEPTH


6.150
B
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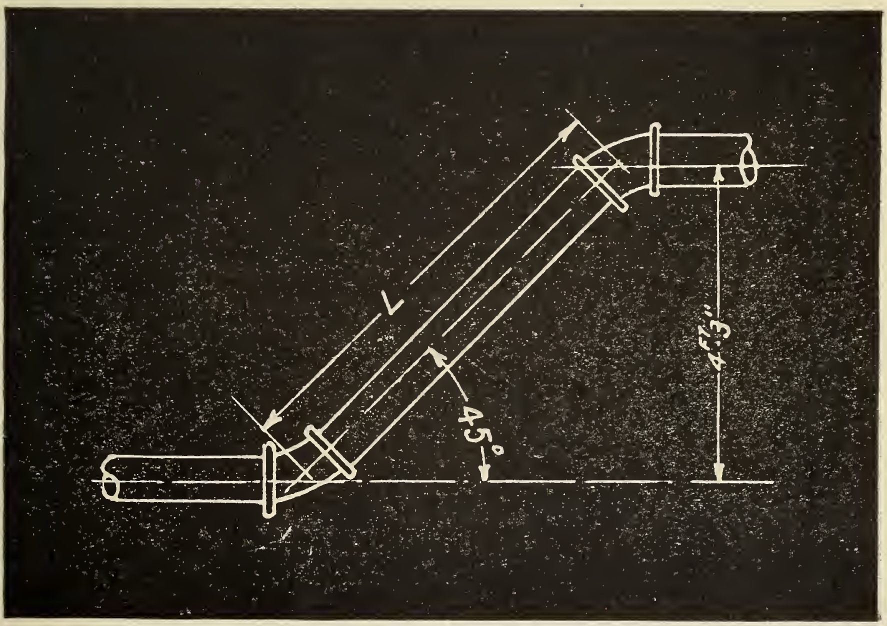
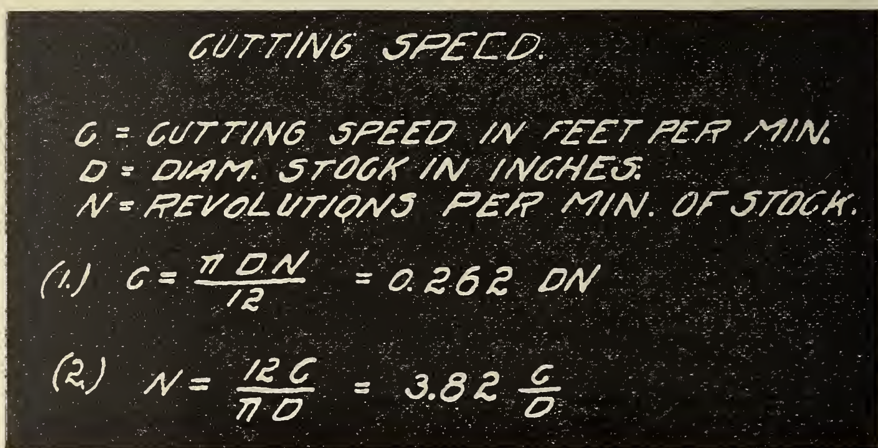
E
C
3.875
4.750
1500
D
90°
2.180


L
45°
4 FT. 3"

followed by the Simple Equation and Evaluation of formulas which trains the student to use formulas he finds in hand books such as $I.H.P. = \frac{P \cdot L \cdot A \cdot N}{33000}$ solving for the value of any one letter when the others are known. Simple mensuration is studied including areas of plane figures such as square, rectangle, parallelogram, trapezoid, triangle, and hexagon. In teaching the circle we use $0.7854\ D^2 =$ area as all circles in shop practice are dimensioned by diameters.

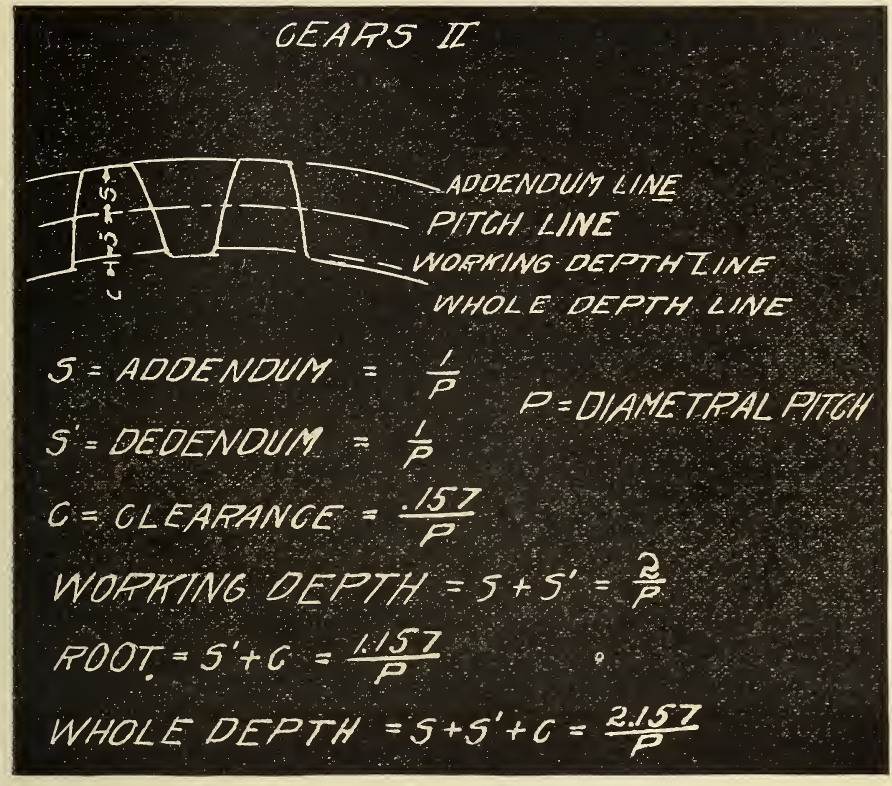
The hexagon is studied right after the equilateral triangle and the relation between the long and short diameters is worked out. $0.866\ D_L = D_S$,

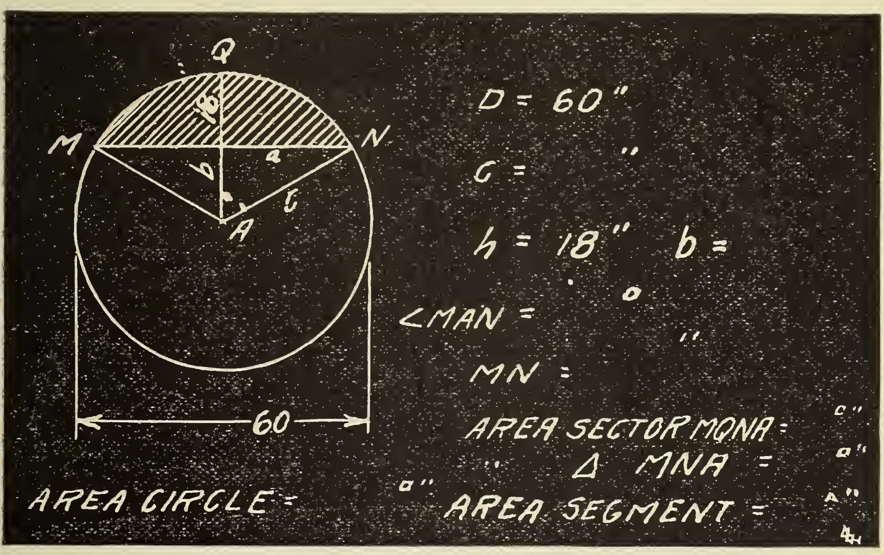


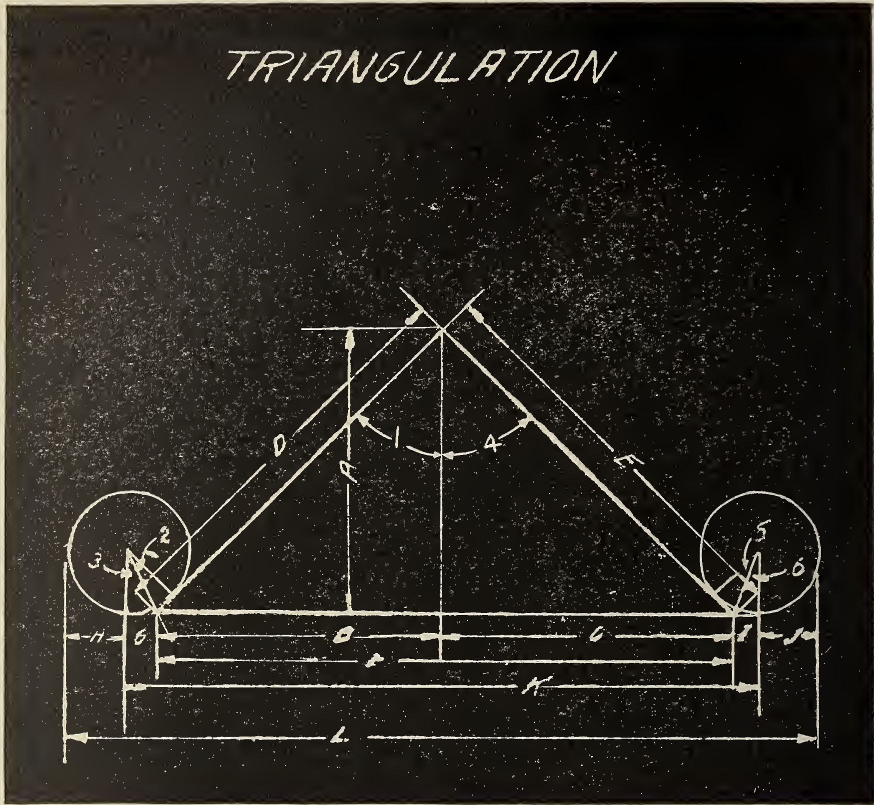
$1.155\ D_S = D_L$. In the shop the hexagon is always dimensioned "across the flats" or short diameter. In volumes we study the cylinder, right cone, hexagonal prism, sphere and torus of rectangular or circular section. Angles and angular measurements follow and triangulation is taken up.

At first the functions of the right triangle only are used as nearly all problems encountered in the shop may be thrown into a form where this solution will apply. A key for the solution of the right triangle is furnished as a sort of "baby walker" which the student soon discards. For drill in this work we find it very advantageous to work out the different lengths of sides, areas of sectors, and segments of the inscribed regular triangle, square, pentagon and hexagon.

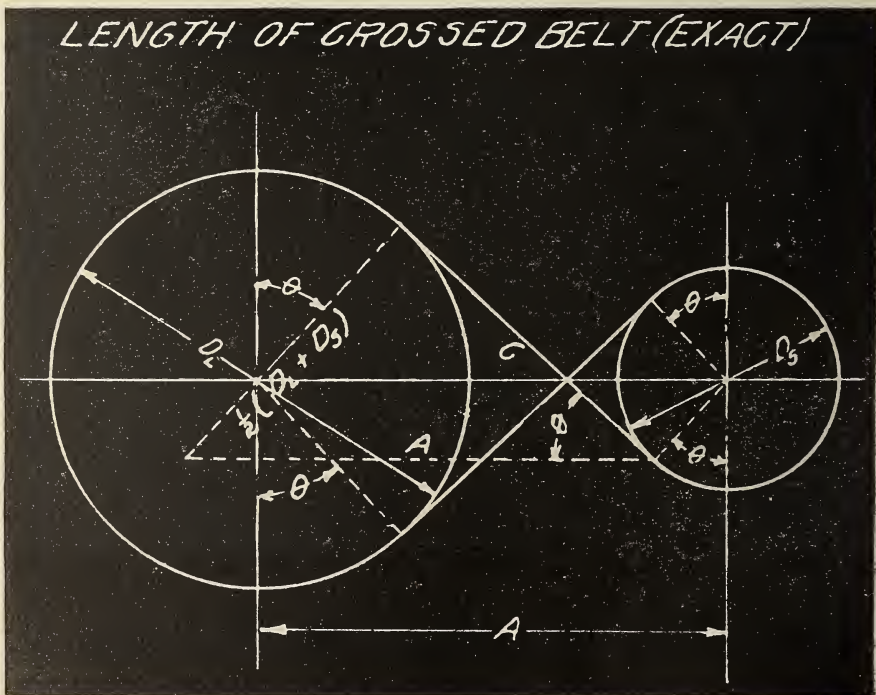
Logarithms are given much attention as their use is rapidly increasing especially among tool makers who have five place tables in all their handbooks. All the "checkers" in one of our largest plants use "vega's" tables. Cube root is not taken up until now and only with Logs as it is a sort of torture we do not care to inflict on the average workman knowing that, like


GEARS II
ADDENDUM LINE
PITCH LINE
WORKING DEPTH LINE
WHOLE DEPTH LINE
S = ADDENDUM = 1/P
S' = DEDENDUM = 1/P
P = DIAMETRAL PITCH
C = CLEARANCE = .157/P
WORKING DEPTH = S + S' = 2/P
ROOT = S' + C = 1.157/P
WHOLE DEPTH = S + S' + C = 2.157/P


Q
M
N
A
18
60
D = 60"
C = "
h = 18" b =
∠MAN =
MN =
AREA SECTOR MQNA =
" Δ MNA =
AREA CIRCLE =
AREA SEGMENT =

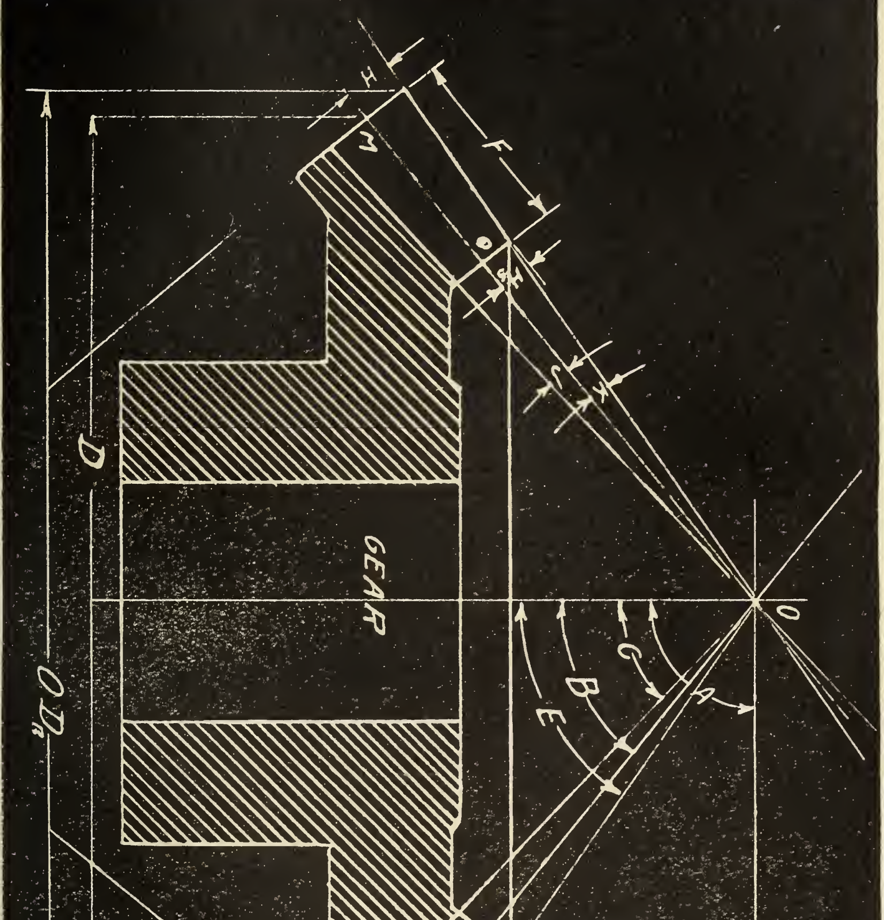


TRIANGULATION



LENGTH OF CROSSED BELT (EXACT)

BEVEL GEARS.



vaccination, even if it takes he will have to go all over it again whenever he runs into a cube root epidemic.

The slide rule is rapidly coming into general use by the more skilled mechanics and I believe inside of ten years it will have a place in the tool box along with the hand book, bevel protractor, and micrometer. There is absolutely no reason why its use should be left to the college engineer and like grape fruit, olives, and other blessings of modern times should be acquired early in life. The ten-inch rule is accurate enough for the majority of shop problems and if not it is invaluable for checking over work. During the past winter 200 workmen in our evening and continuation classes have purchased and learned to use calculating rules.

When the student has completed the course of study briefly outlined above he will have very little trouble in handling almost anything in the way of problems he may encounter in the shop.

A few examples will give an idea of the sort of applications of mathematics encountered in the metal working trades.

FARM PROBLEMS.

PROFESSOR LLOYD C. EMMONS, MICHIGAN AGRICULTURAL COLLEGE.

It is perhaps wise before presenting these problems to distinguish between farm problems and problems which are inspirational for the student in agricultural courses. While the problems that I will present may not be directly applicable in any one student's field of endeavor, yet each has an agricultural flavor and is, therefore, not repellant to any of the students to whom it is given. At the Michigan Agricultural College, the agricultural students' antipathy to mathematics had become traditional. Until the course in algebra, which every student is required to take, was revised, the common request from the freshmen was, "I have too much work. May I drop my mathematics?" Since the revision of the course and the vitalizing of the subject matter presented, it has been observed that the students will drop any subject rather than the mathematics.

It has not been the intention of the department of mathematics to dilute the subject matter and therefore attract the students by making it a "snap course." A few examples of the type of problems presented will make this fact evident.

The department believes, and thinks that it has shown conclusively that it is true, that if the average student is given a task that gives promise of having any application to his chosen field, he will find time to devote to the accomplishment of that task.

Two or three examples that the student in this course is called upon to solve will now be given:

1. The relation between the number of tons of ensilage in a 16-foot silo and the depth of the ensilage is given by $T = f(d) = .051d^2 + 2.5d$. Find the number of tons contained in a 16-foot silo which is filled to a depth of 35 feet. How much remains after 15 feet is removed from the top?

Solution: $T_1 = f(35) = .051(35)^2 + 2.5(35) = 150$ tons

$$T^2 = f(35) - f(20) = 80 \pm f(35 - 20).$$

2. To what depth should the above silo be filled in order to contain 180 tons?

This example ostensibly involves the solution of the quadratic:

$$.051d^2 + 2.50d - 180 = 0.$$

We find $d = 40$ feet approximately.

3. It has been determined by experts that a 1,000-lb. dairy cow should have approximately 15.9 lbs. carbohydrate equivalent and 2.21 lbs. protein. Taking this as a standard and the following analyses of timothy hay and cow peas, determine the amounts of these feeds necessary to form a balanced ration for a 1,000-lb. dairy cow.

	CH. eq.	Prot.
Timothy	.506	.062
Cow peas	.592	.236

Solution: The simultaneous equations

$$.062T + .236P = 2.21$$
$$.506T + .592P = 15.9,$$ follow from the conditions of the problem. Solving, we get $T = 29.6$ lbs., $P = 1.6$ lbs.

These three examples will serve to illustrate the character of the work that our students are called upon to do. They soon learn not to be surprised if, upon solving a quadratic, the discriminant is not a perfect square. The long multiplications and divisions necessary in solving Example 3 soon convinces the student that graphs were not invented, as were rut worms, merely to be an annoyance to the incipient agriculturalist. I am firmly convinced that, while the student may know less about continued fractions and the remainder theorem than those who follow the stereotyped course in college algebra, he does acquire as much ability to think for himself as the average freshman and completes the course in a better frame of mind.

BIOLOGICAL CONFERENCE

REVISED REPORT OF THE BIOLOGY COMMITTEE OF THE NATIONAL EDUCATION ASSOCIATION ON THE REORGANIZATION OF SECONDARY EDUCATION.

PROFESSOR LE ROY H. HARVEY, WESTERN STATE NORMAL SCHOOL.

I. Introductory Statement.

The leading features of this report are (1) its argument for a two-years' course in elementary science planned as a whole, and (2) its suggestions as to ways in which such a course may be arranged to suit the needs of various localities.

The prevalent practice of organizing elementary science into separately planned one-year units is unsatisfactory. Many kinds of one-year units have been tried as first science courses, and none of them has proved wholly satisfactory. No plan, in our opinion, will prove satisfactory until sufficient time is allowed for meeting the needs both as to content and as to method and organization.

Such allotment of time as we propose has already been made, if we take into consideration the eighth as well as the ninth grade. Semi-departmental teaching in the eighth grade, especially under Junior High School Organization, has provided the opportunity for continuous work in elementary science in grades eight and nine. Thus our report does not propose more time for science than is already alloted in many schools; it merely proposes that this two years of work be planned as a whole and not as separate units. It does, however, call for more attention than is commonly given to organizing this work.

Science is the only major high school subject in which attention has not heretofore been given to the planning of courses more than one year in length. With the opportunity now afforded to bring about a more intimate relationship between the eighth and ninth grades, we believe that serious attention will be given to the principle of "two years, planned as a whole."

The popularity of general science proves the need that is felt for wide scope of subject matter. General science places no limit as to scope, but this enlargement of scope has rarely been accompanied by enlargement of time. This we believe to be unfortunate. We propose to extend general science into a two-year plan, so that thereby its values may be more fully realized, and that correction may be made of the shortcomings due to congestion of subject matter and consequent superficiality of treatment. The theory of general science—the theory of a general acquaintance of nature to be ac-

quired through experience and interpretation by scientific method—this theory we heartily endorse. But the practice of attempting to carry out this theory in a single year of work appears to us destructive of important educational values.

II. Aims in Elementary Science.

In the following sections the Committee has set forth an argument for a course in elementary science which, in their judgment meets the administrative and pedagogic needs of the situation.

As we were completing the revision of our report we received the published report of the Committee on Program of Studies of the Illinois High School Conference, adopted Nov. 20, 1915. The statements of that Committee are thoroughly in harmony with our own views and with the permission of its chairman, Dr. W. C. Bagley, we have incorporated in our Report the conclusions of this Illinois Committee.

In order that the purport of our argument may be clear, the following aims in elementary science are stated, and in a parallel column we have placed corresponding aims that appear in the Committee Report to which we have just referred.

Statement of Aims of Biology Committee.

1. It should arouse interest in nature, by giving boys and girls first-hand acquaintance with their environment.

2. It should emphasize some of the most important applications of science to human welfare, and especially should familiarize the pupils with the structure and functions of their own bodies to the end that they may know how to live healthfully and happily.

3. It should give pupils some training in careful observation and in forming logical conclusions,

Statement of Aims from Illinois Report.

1. It should acquaint the pupil with the facts and principles of natural science primarily through the use of environmental materials, to the end that he may understand and appreciate the objects and forces with which he comes in direct and frequent contact.

2. It should acquaint the pupil with those facts and principles of natural science that have outstanding value either because of their wide application to the problems of daily life or because of the important role that they have played in the development of civilization and the consequently significant part that they play in the thought and action of this generation and of future generations.

3. It should utilize among other methods of teaching that method which emphasizes the solution of

through the solution of problems, and the carrying out of projects.

4. It should make real to the pupils the meaning of intensive study of any given science as a means of showing the manner in which scientific progress is attained.

problems and the carrying through of unified projects, to the end that the pupil may be led to appreciate the value of scientific knowledge as an instrument in the solution of human problems and to the end especially that the pupil may gain through actual experience practice some initial skill in scientific method, and a keen appreciation of the value of this method.

4. It should serve as an introduction to the more intensive study of the special sciences, but

5. It should also be organized and administered with the distinct recognition that it will be the only course in natural science as such that a large proportion of the pupils will pursue; consequently, it should represent, especially in content, the types of educative outcomes that are peculiar to the natural sciences and which, in the well rounded education of any individual, are essential to complement the outcomes which are sought in other subjects.

III. How the Aims may be Realized.

This Committee offers the following program for organizing a two-year course in elementary science in accordance with the aims just stated.

1. Where the Junior High School is in operation we suggest that this work follow the seventh year work in geography, and continue through the eighth and ninth grades.

2. Where the Junior High School does not as yet exist, we suggest that the nature study of the eighth grade be continuous with the science work of the first year of the high school, and that it all be organized as a single course under the general supervision of the high school teachers.

3. In general we suggest that there be a study of physical environment, plants, animals and man.

In view of what science has meant to our present-day civilization; in view of the measure in which the method and the results of scientific investigation are today reflected in intelligent thought and intelligent action; the

right of natural science to rank as an indispensable element in the culture of all the people cannot be ignored.

Lack of co-ordination in the various branches of science as at present taught, failure to reach definitely the underlying principles of science and to relate these principles to life, are some of the criticisms aimed at our present-day science teaching. We believe that this is due in the main to poor teaching and to the organization of science into separately planned year units.

The aims stated above and the correction of the defects just cited call imperatively for a longer time for elementary science, and we believe that this should be a two-year minimum. Mere extension of the time limit, however, will not correct the teaching defects, or allow the desired ends, unless provision is made for unifying both the content of the course and its pedagogical direction. In this connection the Illinois Committee states its conclusions:

"The Committee believes that the organization of a course in elementary science covering two years would be of large value in the solution of the science problem in the public schools. . . . Where the Intermediate or Junior High School has been introduced, the Committee suggests that the organization of such a two-year course in elementary science be carefully considered for the eighth and ninth grades. We believe that it may likewise be practicable in other systems where the eight grade work is departmentalized. It could perhaps be offered in the ninth and tenth grades of small high school's where courses in the special sciences are impracticable. . . .

"As a general introductory course specifically designed for relatively immature pupils, it will emphasize the practical, concrete applications of the scientific method and of the important principles that have been established through the employment of this method. The intricate and detailed study of natural science involving abstractions that are remote from the pupil's experience and consequently difficult for him to understand and appreciate, will be left for the special courses in the later high school years.

"As a two-year course it will allow a certain amount of organization in the sequence of topics, while at the same time, it will afford ample opportunity for approaching every topic from the point of view of the pupil's needs, interests, and experiences; in other words, it will combine the advantages of the two modes of organizing educational materials that are sometimes contrasted under the terms, logical and psychological organization. In the opinion of the Committee, an emphasis of either form of organization at the expense of the other would be unfortunate.

"It will permit a much more effective organization of the courses in the separate sciences offered as electives in the later high school years. With the preparation that this introductory course provides, and with the enrollment in the special courses limited to those pupils that have a distinct capacity for the more abstract and detailed study the special courses could be

made administratively equivalent to the introductory courses offered in colleges. In the belief of the Committee this would tend to terminate the present anomolous condition where we find pupils who have completed introductory science courses in the high schools compelled to repeat essentially the same ground in the college.

"While recognizing that opinions will differ widely as to the sequence of the larger topics in the course, and that much careful experimentation would be needed to determine the most effective sequence, the Committee suggests as a tentative proposal that the course proceed from simple inorganic phenomena to the more complex phenomena of organisms culminating in the study of man. This sequence is roughly indicated by the terms, *physical environment, plants, animals, and man.* The marked advantage of this sequence proceedure is that it preserves a continuity with the natural science materials that have been standardized under the general term, geography, in the elementary curriculum. Thus a start is made in a field in which the pupils have already had educative experiences."

The problem of Elementary Science Teaching involves special factors that are not germane to advanced courses. In the latter, which will be in the main elective, we assume some previous knowledge, or experience, or interest which directs the election. But all must agree that it is a most important function of first or elementary science courses to arouse or direct the child's interest to the phenomena of nature, and it is the feeling of your committee that this purpose is met by grouping this introductory treatment primarily about the applications of science to human welfare. To do this involves a preliminary investigation of the physical environment and, we believe, this can be accomplished successfully only through a required two years course, in which the first part of the course should show the necessity of science for explaining the adjustment of the individual to his environment, while the latter part should emphasize the manner in which physical biological science has accomplished this task in various fields, leaving the pupil in later electives to pursue the matter and methods of special sciences, such as physics, chemistry, physiography, botany, zoology, or agriculture.

IV. Content of a Two-Year Course in Elementaty Science.

We wish to emphasize at the outset our conviction that the time has not come, and probably never will come, when a science committee is able to prescribe the *best content* for any course in science. Colleges and Universities by their rigid entrance requirements, especially in physics and chemistry have, in our judgment, seriously handicapped secondary school teaching.

Hard and fast requirements in either elementary or advanced science ought never to be fixed by any committee or by any higher institution because of the wide variations of physical environment, fauna, and flora in Maine and California, in New Mexico and in North Dakota. Different

types of courses should be given also in urban, suburban, and rural schools. Any work of the committee, therefore, along the line of formulating content should be accepted as an attempt to give a maximum of suggestion and a minimum of prescription.

Teachers should select material best adapted to local conditions, should plan out in advance the work that is to be done and should improve the course with each year of experience. In an agricultural community special study should doubtless be made of the plants and animals of local economic importance. In communities engaged in mining or manufacturing relatively more emphasis will be made in the study of the matter and forces in the physical environment. In large towns and cities community sanitation and civic betterment will receive the major stress. Every child, however, whether in the country or the city should be given such instruction in the care of his body and his mind that there will be a perceptible improvement in the health conditions and general efficiency of the community.

There are, however, certain general features that we believe should be stressed in all elementary science courses. Some of these are stated in the following paragraphs, and in the appendix we have suggested somewhat more in detail our ideas of a possible point of view in presenting the main facts of physical environment, plants, animals, and man.

In our Preliminary Report (published in School Science & Mathematics, Vol. 15, 1915, pp. 44-53) we made the following statement:

"The preparation of an outline for teaching the part of the course in elementary science which deals with the matter and forces of the physical environment, together with the general applications of the principles of science to human welfare and convenience awaits the cooperation of the other sub-committees in the sciences. For it is our hope that in the near future all the science committees of the National Education Association will unite and contribute of their best thought in constructing a course in elementary science so full of promise that no school can afford to omit the teaching of its universal principles."

We have been much encouraged by the promise of hearty cooperation on the part of other sub-committees in science, and we trust that before our final report is issued, the portion dealing with the matter and forces of the physical environment may be fully elaborated. Hence, in considering this report prepared by the biology sub-committee alone, the reader should not be misled by any undue emphasis on biological factors that may seem to be apparent.

We believe that organisms should be studied from the point of view of (1) their relations to their inorganic environment and to each other; (2) their nutritive (or metabolic) functions; (3) their reproductive functions; and (4) the relations of each of the organisms studied to human welfare. (In the term "human welfare" we wish to include not only economic and hygienic aspects, but their aesthetic values as well).

Too much emphasis can hardly be placed on noting the similarities and differences in the functions of the various types of plants and animals, including man. As the study progresses, tentative summaries should be made which will be later modified as need may arise.

Since for a large number of students this will be the only science course of the school curriculum, it is important that they get at least a very elementary conception of the great ideas relative to evolution, and some of the applications of this principle to human progress. Incidentally they should be led also to appreciate something of the lasting indebtedness of mankind to great scientists like Darwin, Tyndall, Lavoisier, Harvey, Pasteur, Marconi, and Edison.

This Committee feels that logical sequence and unity of subject matter are of great importance in any science course, elementary or advanced. It holds that only through such sequence and unity does a child or adult gain a clear idea of the underlying principles of a science. Such a proceedure does not sacrifice the idea of interrelation between the sciences or of employing the project method. On the contrary, through the unity of the course, the idea that pursuit of any one science intensively must inevitably result in a general vision of all science is one of the most important results of this form of treatment. On the other hand, study of isolated phenomena almost inevitably result in a mass of informational material and a sacrifice of the very ideals that true science endeavors to inculcate.

V. Methods of Instruction.

We do not believe in rigidity of method in teaching science. Observations, experiments, excursions, individual reports, text-book assignments, quizzes, conferences, are all good. They offer a rich and varied choice of pedagogical method and each teacher should be given freedom to develop the methods best adapted to his students and to the environment of the school in which he is teaching.

In conducting field trips or museum excursions the teacher should know in advance the best kind of material available and the use that is to be made of this material. Work in the laboratory should be planned so carefully that time is not wasted in too detailed microscopic work, in complicated experiments, in too elaborate drawings, or in mere "busy work" to keep the children out of mischief until the end of the period.

All laboratory work should be attended by information ungrudgingly and interestingly given by the teacher, which should stimulate the student to seek more knowledge at first hand. Wherever possible, laboratory work on any given form should precede textbook assignments or library references, and since most high school students do not know how to use books effectively, these assignments and references should be very definite.

Experiments, results, conclusions, observations and drawings should be accurately recorded. Neatness in these records is desirable, but this

should not be exalted above thinking and understanding what it all means. Careful labelling of drawings is important; careless spelling and ungrammatical sentences should not be tolerated.

We heartily approve of the use of the so-called "problem" or "project method" of teaching the various topics whenever this method can be utilized without a sacrifice of the principles of unity to which we have already referred. Indeed, this method of instruction is commonly employed by every good teacher no matter what his subject may be as a means of developing and maintaining interest. We are confident, however, that courses that consist *merely of a succession of more or less detached projects are quite likely to be lacking in both logical and pedagogical unity.*

VII. Possible Abuse of Laboratory Method.

The laboratory method in science was such an emancipation from the old-time bookish slavery of pre-laboratory days, that many teachers have been inclined to overdo it and subject themselves to a new slavery. It should never be forgotten that the laboratory is merely a means to an end—that the dominant aim in all laboratory instruction should be a consistent chain of ideas which the laboratory may serve to elucidate. The primary question is not what plant or animal *types* may be taken up in the laboratory, but what *ideas* are most worth while to be worked out and developed in the laboratory.

Too often our study of an animal or plant takes the easiest rather than the most illuminating path. What is easier, for instance, particularly with a large class of restless classes who apparently need to be kept in a condition of uniform occupation, than to kill a supply of animals, preferably as nearly alike as possible, and set the pupils to work drawing the remains? This method is often supplemented by a series of questions that are designed to keep the students busy a while longer.

Such an abuse of the laboratory idea should be avoided. The ideal laboratory is only a reasonably good substitute for out of doors. Any course in biology, when confined within four walls wholly, even if these walls be those of a modern, well-equipped laboratory, is in some measure a failure. Living things, to be appreciated and interpreted correctly must be seen and studied in the open where they will be encountered in life. The place where an animal or plant is found is just as important as its shape or function.

In our judgment, relatively few plants or animal forms should be studied; but it is essential above all things that each of these plants and animals be supplied to the students, and that all possible work be done while the organisms are alive or when they are freshly killed. Experience has shown that young students usually lose any enthusiasm they may have had for biological study if they are compelled to work with preserved materials. In general, it is doubtless wise to study plant and animal material common in the environment; students can then collect a good deal of material and

can also study its normal relations. We cannot emphasize too strongly our belief that mere text book study of science has no place in this day and generation in an efficient system of education.

As Dr. Chas. W. Elliot and other educational leaders have urged again and again, any laboratory exercise is unsuccessful insofar as it fails to develop right mental processes of observation and reasoning.

VII. Suitable Equipment.

It is very desirable that a definite room or rooms be set apart for work in elementary science, since at least a minimum equipment is essential, and this cannot be transported from room to room without a considerable loss of efficiency. While it is desirable to have tables, or at least flat-topped desks of good size, satisfactory laboratory work can be done in an ordinary classroom if it is well lighted. The laboratory should be equipped with a demonstration table and gas connections if possible, with sink and running water, and a broad shelf should be placed in front of the windows for supporting growing plants and aquaria, and for use in demonstrations with the compound microscope. Ample closet room should be provided, in which to store apparatus and supplies, so that they may be kept free from dust.

Besides the test tubes, gas burners, and other apparatus usually obtainable from the physics or chemistry departments of the school or from the home kitchen, the minimum equipment for each laboratory should be one compound microscope, together with magnifiers, dissecting needles, glass slides, and cover slips for each student. Botanical and zoological charts are very useful and many of them can be made by the students or by the teacher. An articulated skeleton can often be borrowed if the school does not possess one. The more experienced and the more skillful a teacher of science gets, the more different things he is able to do with a single piece of apparatus. We wish to emphasize the fact that a course in elementary science can be carried on successfully without any large expenditure for apparatus or materials. The most important consideration is that the course be conducted by a live teacher.

VIII. Training of Teachers in Elementary Science.

The great problem in teaching elementary science, indeed in all teaching—is that of securing teachers who are fitted in an adequate degree to do the work. In the judgment of the Committee every high school teacher of science should receive preparation in higher institutions of learning at least along the following lines:

1. He should have a broad knowledge of the whole field of natural science.

2. He should have studied biology sufficiently intensive to grasp the spirit of that subject.

3. He should have a grasp of the psychology and pedagogy of the adolescent.

4. He should know the aims and best methods of teaching elementary science.

It is therefore evident that prospective high school teachers of elementary science should have a training different from that of a candidate for the degree of Ph.D. where research along more or less narrow lines is a prerequisite. Dr. Thomas H. Balliet, Dean of the School of Pedagogy, New York University, in an article in the "School Review" of April, 1908, describes the present situation very clearly and suggests a remedy,—"The highly specialized training of the best graduate schools seem to make it difficult for the young teacher to view his work from the standpoint of his pupils rather than from that of his subject. It is absolutely necessary that the chief interest of the teacher in the secondary school be in his pupils rather than in his subject; and the perennial source of interest in secondary school work must be in the new problems which each new class, and indeed each new pupil, presents more than any researches which the teacher has the time and strength to make in his special field. A teacher in the secondary whose deepest interest is in his subject will find, after a series of years, secondary school work exceedingly disappointing and uninteresting. My contention is that graduate instruction in our universities does virtually nothing to fit a teacher to either science or mathematics in a vital way in secondary schools. It may even be possible that the highly specialized training of the graduate school, to a certain extent, unfits the student to do this sort of teaching. However that may be, I state a well known fact when I say that not one in fifty of the men and women who take the Doctor's degree in science or in mathematics, has the least conception of the problem before him when he begins teaching in a secondary school,—I venture to suggest in a purely tentative way the following as possible (but perhaps only partial) remedies.

"The graduate school may make a distinction between two classes of students, those who are fitting themselves to teach in universities and colleges, and those who are preparing to teach in a secondary school. . . . The latter might be allowed to work in a broader field, to acquire a fair mastery of several related sciences, without being required to specialize narrowly, and be permitted to present a thesis which gives evidence of their having made themselves familiar with the methods of research in the subjects which they expect to teach without requiring them to make any strictly original contribution to their specialty.

"I suggest that the most important remedy would be to oblige every student in a graduate school who wishes to teach in a secondary school or in a college to study education both as a science and as an art, and make himself familiar with the best methods of teaching the subject which he is fitting himself to teach. . . . The rapid development of departments of educa-

tion in our colleges and universities indicates that there already exists a wide recognition of the need of such training."

The Committee would urge that the differentiation suggested by Dr. Balliet begin, if possible, even as early as the senior year of the college or university, and continue throughout the graduate work. It is hardly necessary to add that one of the most important elements of this training is ample opportunity for practice teaching under the *direction of those who have had successful experience in secondary work.*

Science teachers already in service should be given encouragement by supervising officers and boards of education to add to their efficiency by wide reading, by visiting schools where good science work is being done, and by taking university summer courses in subject matter and methods of teaching.

Appendix.

(*a*) *Physical Environment.*

The committee's general idea of the nature of the study of Physical Environment is as follows:

Study of the makeup of air, earth, water and soil, and the forces at work in the universe. This study should acquaint the pupil with the nature of his environment and emphasize the necessity of his adjustment to it. In selecting material for this part of the course, the guiding principle should be not merely to present information about nature, but to help the young student to realize the active changing world of which he is a part, and in which, by his own well-directed activity, he may guide his life properly. For this whole study finds its ultimate unity in the relations between physical environment and human life.

Many of the phenomena of nature form a part of our commonest knowledge. This knowledge, however, is usually fragmentary and unrelated. Emphasis should be laid early in this study on the constant flux and change in the physical environment, and on a corresponding flux and change in living things.

Matter appears in three states—solid, liquid and gas, and the same matter may appear in any one of these three forms. Water, for example, the chief liquid becomes a gas or a solid under the influence of different temperatures. This universal liquid is of supreme importance in the environment of living things. The ocean affects climate, current and winds. Acted upon by the sun, water rises from the ocean, in the upper air condenses, and pours itself out upon the land. It is the great sculptor of the earth's surface, and the vehicle of transportation of portions of the earth's crust. Water pervades the air, the soil, and the tissue of all living things. It is the great solvent and so becomes the food carrier in plants and animals, the waste remover from living cells; hence it is important in all living processes.

In studying the atmosphere we should consider some of the simpler processes—elements combining to form new compounds, compounds breaking up into elements. Attention may be called here to the combination of water and carbon dioxide in the process of photosynthesis. Some concrete idea should be gained relative to energy—how it has been stored through past ages and what is meant by its transformation and conservation.

Again, the solid particles of the soil are subject to constant change. They are transformed by the plants in the process of their nutrition and are in turn broken down by other plants and animals. Since the beginning of time the same forces have been at work. A study of the stars, the solar system, and the earth's geological story teaches us how vast is the energy round about us. The force of gravitation acting among the planets, the combination of elements in rock-formation, the changes when the earth's crust cooled and the atmosphere took its present character, the wonders of electrical and atomic energy—all these should be realized as manifestations of a changing world in which man has played an increasingly important part as fast as he has understood and made use of the forces that lie about him.

(*b*) *Plants.*

In introducing the study of plants, the teacher should be governed very largely by the environment in which he is working. Pupils are usually interested in the plant forms common around them; hence from the interest standpoint this is the logical angle of approach. This first study should be in the nature of a general survey of the locality and the pupils should thereby become acquainted with the names of common plants, the places where they are found, their distribution as regards the soil, the water supply, the elevation, their relation to one another in forming plant societies, and their economic values to man and to the animals associated with them.

This introductory survey should be followed by a more or less detailed study of the nutritive and reproductive functions of plants, both as a means of understanding the work of plants themselves, and as an introduction to these functions in animals and man. A special advantage in this early study of plants lies in the fact that these organisms lend themselves so readily to definite experiments and the conclusions derived therefrom can be reviewed and applied in the later work on animals and man.

(*c*) *Animals.*

Animals should be studied in a course in elementary science not only because of their economic and aesthetic values, but also because the student thereby gets a clearer understanding of the structure and the functions of his own body. The forms selected for study should, as far as possible, be those common in the local community. Students should be urged to observe them in their habits and to collect some of them and to note various adapta-

tions for the life they lead. When this collecting is impossible the various forms should be secured alive for laboratory observation.

In general it is unwise to attempt any very detailed study of either external or internal anatomy. Instead, the students should be led to note the striking resemblances and differences in the representatives of the different groups studied, and especially to study the way each important function is carried on by a given animal.

It is by no means necessary to consider the various animal forms in the order of their supposed complexity, or in accordance with tables of classification. Insects, for example, may well be studied first in the autumn when they are most abundant, and this work may be followed by a consideration of the birds that prey upon the insects. The number and the range of the forms studied will, of course, depend upon the time available, the environment where the work is carried on, and to some extent on the special interests of the students. The teacher should first of all determine what are the *big principles* to be taught and should then select his laboratory material with these principles in mind.

(*d*) *Man.*

The committee is unanimous that the work in human biology should be closely correlated with a study of physical environment and with plant and animal biology and that emphasis should continually be laid on personal hygiene and sanitation. Details of structure and anatomical terms should, therefore, be given only when they are needed for an understanding of the given function or for correlation with other parts of the course. It should be understood that while the topics in hygiene and sanitation for convenience are grouped together in the suggested content (see Appendix D) in framing a course these various topics should be taught in connection with the various functions with which they are most closely associated.

To present the various topics most effectively, a manikin and a human skeleton should be available. If, however, this is impossible, charts, pictures, and blackboard diagrams should be freely used. Bones, joints, hearts, lungs, and other organs available in a butcher's shop should be employed for demonstration. The student should always be led, however, to refer the various functions and hygienic applications to his own body, and care should be taken to see that few experiments are performed that do not have possibilities of this practical nature.

Whenever the teachers of physical training possess adequate training and have the time it may be possible to incorporate parts of the work on human beings under that subject. Such a correlation of the work of the two departments makes for doubled efficiency.

Basing their selection upon the above general ideas, teachers should select material best adapted to local conditions, should plan out in advance

the work that is to be done and should improve the course with each year of experience.

In an agricultural community special study should doubtless be made of the plants and animals of local economic importance. In communities engaged in mining or manufacturing relatively more emphasis will be made in the study of the matter and forces in the physical environment. In large towns and cities community sanitation and civic betterment will receive the major stress. Every child, however, whether in the country or the city should be given such instruction in the care of the body and his mind that there will be a perceptible improvement in the health conditions and efficiency of the community.

(*e*) *The Biology of Sex.*

In our judgment there is no portion of elementary science that is of more importance to adolescent boys and girls than is the biology of sex. Unfortunately this vital topic is almost wholly neglected by the average parent and few social agencies as yet see their way to give this much needed instruction. It may be safely said, however, that no boy or girl reaches the age of fourteen without having received a considerable amount of sex information, information that is usually of a most distorted character and of unclean association. Most of these boys and girls long to find some one possessing the requisite knowledge who can frankly talk with them of adolescent experiences.

A rare opportunity is therefore open to properly trained teachers of biology who have the right point of view of giving this much needed help, for in this subject the approach to discussion of sex is easy and natural and devoid of pathological aspects. An increasing number of good biology teachers are undertaking this phase of instruction, and the unsolicited testimony of youths and parents shows results from this natural approach rather than from the pathological aspects that are most encouraging. It is hardly necessary to state that when this instruction is given the boys and girls should be taught in separate groups, and that the instruction should be given only by men teachers to boys and by women teachers to girls, teachers whom the students already know and trust.

Important, however, as is the teaching of the facts of reproduction and the hygiene of the reproductive organs, a knowledge of these alone is not very likely to keep boys and girls from bad practices when the time of temptation comes. "The inadequacy of mere knowledge in the realm of sex hygiene," says President Foster of Reed College, Portland, Oregon, "is painfully evident. To the *knowledge* of what is right must be added the *will to do* the right." Hence, in our judgment, all physiological instruction relative to sex should be supplemented and strengthened by sane appeals to the ethical and religious nature of boys and girls.

Organization of the Biology Committee.

In the autumn of 1913, Chairman Orr of the Committee on Natural Science appointed the sub-committee named below to suggest the aims, the content, and desirable methods of instruction in secondary school biology. The committee as now organized consists of nine high school teachers, three college or university professors, three normal school instructors, and one physician. The geographical distribution of the committee membership is as follows: three members from New York and vicinity, five from Chicago and vicinity, three from New England, and five from the Pacific Coast.

During 1914-1916 ten meetings of the committee have been held in New York City, and the Chicago, the New England, and the Pacific Coast groups have had several conferences.

We wish to express our special indebtedness to Dr. Thomas H. Balliet, Dean of the School of Pedagogy, New York University, to Dr. Thomas M. Briggs of Teachers College, and to Professor Charles E. Rugh of the Education Department of the University of California for their constructive criticism of both the preliminary and revised reports.

The committee hopes that the publication of this revised report will lead both science teachers and administrative officers to consider carefully the suggestions herein contained, and to send to the Chairman or any member of the committee a large number of constructive suggestions. The report will then be further revised before its final submission to the Reviewing Committee of the N. E. A. Commission.

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In the death of its Secretary. Dr. Grace C. Cooley in January, 1916, the Committee suffered a great loss. Miss Cooley was one of the most active members of the Committee. Her long experience as a teacher of first-year science, her talent as a teacher, her thorough scholarship, and her charming personality combined in rendering her services to the Committee invaluable.

* The death of Miss Lillian B. Sage in December, 1914, has been deeply felt by the Committee. As Head of the Department of Biology in the largest high school for girls in the world, she had wide experience, and her wise counsel has been badly missed.

DISCUSSION OF REPORT ON ELEMENTARY SCIENCE SITUATION.

PROFESSOR E. D. HUNTINGTON, WESTERN NORMAL.

The essential difference between co-called *"elementary science"* and *general science* is that the former would present the elements of certain specialized sciences to the child from the standpoint of the sciences, while *general science* would select facts and principles from the whole field of science according to the needs of the ninth grade child and endeavor to present this subject matter to the child by such methods as will arouse and hold his interest. *"Elementary science"* would subject the child through successive semesters to the elements of physics, botany, zoology, hygiene and physiology, disguising those subjects under the titles of physical environment, plants, animals and man. If chemistry were included this "elementary science" sequence would represent a fairly ideal college course in the sciences, which is to be telescoped and shoved down into the high school. But no, it is alerady there. Are not these courses in physical environment, plants, animals and man but our old time friends, physics, botany, zoology and physiology and hygiene that have already proved such failures in the high school?

In contrast, *general science* would analyze the needs of the ninth grade child, and select such facts and principles from any and all branches of science as will fulfill these needs, and by grouping this subject matter about the facts of the pupil's every-day environment, endeavor to present this subject matter in such a way that the general principles of science will be associated in his mind as phenomena of his surroundings, and not as abstract definitions.

To date, the sciences have been unsuccessful in the high-school, and there is an ever growing tendency to change science courses from require-

ments to electives. Science now has the right of way in every field except the high and elementary schools: it is the basis of engineering, architecture, medicine; the courts base their decisions upon the testimony of science; the scientific method has entered business and commerce; and science is even now revolutionizing and unifying the various religious creeds. The newspapers and periodicals are crowded with facts and near-facts of science; the general public is intensely interested in the discoveries and problems of science.

At such a time, it would seem that science would be the most interesting, the most popular, and the most useful of all the subjects in the high school curriculum; that it would constitute a great part of that curriculum and be required of all students. And yet in an age when our daily activities and commonest thoughts are determined by the precepts of science, we have awakened to find that the science group is a "weak sister" in the high school curriculum, and that to most students it is neither interesting nor profitable.

What is at fault? Is the failure of science due to a faulty selection and arrangement of subject matter, or to poor teaching? The *general science* advocates hold that the failure is due primarily to the former, and that the subject matter itself has necessarily led to the poor teaching.

There has been little connection between the sciences as taught in the high school and the realities of life; to the child, botany, zoology, chemistry and physics have each appeared as a heterogeneous mass of uninteresting and questionable facts, definitions and rules, to be memorized and held in readiness for final examinations. What he has taken away from these courses has been a hearty dislike for anything that bears the names of the individual sciences, especially botany and zoology.

The failure of the sciences in the secondary schools may be traced to two things: first, the ill-advised and so-called "logical" arrangement of the subject matter, and second, the necessarily resulting arbitrary methods of the "forced feeding" of the unwholesome diet. Teachers of science have unconsciously in the past gone on the assumption that the division of the phenomena of nature into the highly differentiated sciences offers the proper classification under which to present those phenomena to the mind of a child. They forget that what is logical to the adult mind is often illogical to the child's mind, or even to the mind of the adult novice. Teachers have selected and arranged the subject matter of their science courses, not from the standpoint of the needs and interests of the child, but almost wholly from the standpoint of botany, zoology, physics or chemistry.

Naturally the subjects so arranged have had little meaning for the child. To him, "there is no sense to it."

The second charge that the methods of teaching have been at fault brings on another storm of denial. "We point with pride," to our laboratory work, forgetting, or maybe not realizing, that a large part of the work—to many students, all of it—is merely what the over-taxed country school

teacher calls "busy work," and as such is not only of little value, but had better not be mentioned. Or we may "point with pride" to the splendid notebooks or examination papers that our pupils write for us. But when the student falls into the hands of an inquisitive parent, how soon is the illusion dispelled, and the whole process is proved to be a matter of vicious cramming, and not a matter of understanding!

The above indictments will not be found true bills against every science course or for the methods of every teacher. But just to the extent that a teacher is able to inculcate the principles of science into the understanding of the pupils, to that very extent does he draw upon the child's immediate experiences for his subject matter.

It is quite generally conceded, at least amongst science teachers, that there should be some course in science in the first year of high school, and to us the vital question is *what particular science* or *what subject matter of science* shall be selected. Botany, zoology, physics, physiography, and of late agriculture have all been tried, and unless presented by exceptionally skillful teachers, have been found wanting. Their failure may be quite correctly attributed to the fact that none of these subjects has proved of either much benefit or interest to the majority of students taking the course. In fact these separate sciences have such a bad reputation that very few students enroll in the science courses except under compulsion.

The ninth grade pupil is making his first formal acquaintance with science at a time when his whole nature is crying out for general information about his daily environment. This diversity of interests and keen desire to know affords a splendid opportunity to acquaint him with the general principles and methods of science at a time when it will make the maximum impression on the individual.

What shall be our criteria for selecting the subject matter through which the child is to make his first formal acquaintance with science? Shall we select the subject matter from the standpoint of what will be of benefit and acceptable to the child at this point, or shall our selection be determined by the classifications of the specialized sciences and university requirements? Shall we select and arrange our subject matter so that it will appeal to the logic of the child, or to the logic of the advanced scientist?

If we decide in favor of the child, then our criteria must be first, the *needs* of the child, and second, his *interests*:

The Pupil's Needs.

About thirty per cent of all the children who enter high school fail to return at the beginning of the second year, and so get no science training other than that which they may get in the one year. Many of the other students who continue through high school will take no further science courses unless required. Obviously the science matter presented in this first year should be such that it will prove of maximum benefit to the individual

throughout his life, and not selected as a preparation for other science courses that are to follow. The pupil needs to become acquainted with the commonplace phenomena of his daily environment and acquire what scientific training and knowledge as his immature mind will permit. The subject matter selected should be such that it will function in his daily life, and will lead to an understanding of his own body and his environment. *The fundamental principles and facts of science generally, and not of some specialized branch of science, should constitute the subject matter of the science course at this point.*

The sciences that are essentially fundamental are physics and chemistry. From a scientific standpoint, we must regard every phenomenon of the universe as a manifestation of physical and chemical laws: the atmosphere, earth, stars, plants and animals and even life itself.

General science selects the elemental principles and facts of these fundamental sciences as the *basis* for its science course in the ninth grade, and seeks some group of every day phenomena as a *topic,* the study of which will reveal the principles of science generally and which will make the pupil realize that these principles are a part of his constant experience. The atmosphere serves admirably as such a topic, since it not only involves the fundamental principles of chemistry and physics, and leads directly into the biological sciences, but it also holds the child's interest. It directly involves the mechanics of liquids and gases, heat and aqueous phenomena, density, electricity and sound, and through the oxygen-carbon cycle, leads into the principles of physiology of both plants and animals. Respiration, oxidation, combustion, winds and rainfall, and health itself are among the more vital of the many aspects of this large topic and, when studied as such, their close relationships are manifest.

The Pupil's Interests.

The classification of subject matter into our present day separate sciences can be little understood, and even less appreciated by the immature students. Teachers generally experience difficulty in limiting the developing child's mind to one phase of the world of nature, such as botany, zoology, chemistry or physics. The child is interested in the bearing that all of the above named subjects have on his experiences at a particular point, and can see no necessity for holding back certain knowledge of that topic until he takes another course in another science a year or two later, or never. The young child is interested in topics from all angles; he is not concerned with matter, energy and space, with the periodic law, or with evolution as such. But he is already interested in the atmosphere, from a study of which he gains real conceptions of the fundamentals of physics, chemistry, physiography and biology.

Methods of Teaching.

Too much of our science teaching has been a mere drill on the memorization of rules and definitions as stated in the text-books; but effective teaching of science must aim to have the child acquire a real understanding of the principles involved. But so long as the subject matter presented fails to interest the child and at the same time fails to appeal to his estimation of what is worth while, the teaching process will be the memorizing process, and the pupils will continue to say, "there's no sense to it."

The principles of science have been discovered by induction, and the teaching of science in the high school lends itself splendidly to the same method. Let text book assignment follow, and not precede, class room discussion and experiment. With the inductive presentation, the child is led by question and experiment to discover facts and principles for himself, and they are memorized, if at all, only after they have been comprehended. The pupils are led to discover the problems, which gives the class a keen interest in the solution of them; now problems grow out of the solutions of the present problems and the pupil's interest is held and his mind is alert to grasp the solution.

A common objection to the introduction of *general science* into the curriculum is the assertion that it is wholly impossible to secure teachers for a subject so broad. Any teacher who knows enough chemistry and physics to efficiently teach botany, zoology, physiology or physiography, is sufficiently well prepared in those subjects to teach *general science.*

The advocates of *general science* hold that an appreciation of the general facts and principles of *science* are of far greater value to the average individual, as represented by an average pupil, than is a detailed training in the facts and principles of one or two specialized sciences; that the experiences of the novice are related to all sciences; and that to arbitrarily pick out those particular experiences that pertain only to a particular specialized branch of science, while absolutely necessary for the advancement of science itself, is out-of-place in the child's first and often only contact with science. *Research in science and the teaching of science in the ninth grade have very little relation, and the classification of subject-matter that leads to progress in the one field, leads to stagnation in the other.*

General science advocates would organize the sciences in the high school along the same lines that the courses in a *particular* science are organized in the university. When the university student begins his study of botany, his first course is not in morphology, cytology, ecology, taxonomy or plant pathology. No. He must first take *Botany I. General botany,* if you please, must first be studied before he may attempt its specialized branches. Let us organize our high school science courses along these same lines; let the first course be an introductory course in *general Science. Science I,* if you please, should be studied before the high school pupil attempts excursions into its specialized branches.

PRELIMINARY REPORT ON THE EFFECT OF JUNIOR COLLEGE WORK UPON THE HIGH SCHOOL COURSE IN BOTANY.

ETHEL W. B. CHASE, CENTRAL HIGH, DETROIT.

Since there is a great difference of opinion as to what is meant by "Junior College" work let me review the situation very briefly.

Some of the older colleges have always distinguished the freshman and sophomore, or the two first years of a college course from the junior and senior, or the two last years of the course. In some cases this distinction was based only upon courses open to election after the two earlier years, without any names being given to the divisions, but in other cases the two groups have been known as the Upper and Lower Schools or as the Junior and Senior Colleges.

The latter terminology has been especially fostered in the Middle West by the University of Chicago and in the many smaller colleges, throughout the country which have become affiliated with it. This has become even more marked since the organization of the Crane Junior College of Chicago as a separate institution, offering two years of collegiate work and sending those who complete its courses directly into the third year of college work at the University of Chicago and University of Illinois.

In Michigan the idea of Junior College work in connection with two of the largest high schools, has been an outgrowth of the system of promoting students twice each year. In Grand Rapids Central and Detroit Central High Schools many of the members of the classes graduated in January, found themselves without anything in particular to do between the time of their high school graduation and the time that they could enter college the following September.

In addition to this condition, some students were too young to enter college and in many instances parents object to sending boys and girls of 17, 18, 19, into an institution of the size of the Universityof Michigan and at the same time do not care to send them to a smaller college with its less adequate equipment.

For these various reasons, there has been a greatly increased tendency on the part of students to return to the high school for post graduate courses. This began with a few students fifteen or twenty years ago and has increased until at the present time there are over 100 students in each of the two high schools under discussion, graduates of the regular four-year high school course, who are doing work in subjects not required for high school graduation but which may be used for advanced credit in various colleges.

Originally the subjects offered were confined to the languages, where four consecutive years of work were offered. It was the common practice to take four years of Latin, French or German, or more recently Spanish—

during the regular course, and two years of some other language, and then to return for post graduate work and complete one or two more years of a language. In this way a candidate often presented 17 or 18 units for University entrance instead of the required 15. So far as these larger schools, with their special language teachers were concerned, the University recognized this additional work by granting advanced credit.

With the increased growth of Grand Rapids and Detroit, in a commercial way there also came to be demands for advanced Mathematics, Chemistry and History and Civics, and these were added to meet the demand. The Biological Sciences have lagged behind the others because it was possible for a student to arrange his course in such a way that he could take a course in Human Physiology of one semester, one year of Botany, one year of Zoology, and that was about all the Biological Science he could manage in his course, if he took Chemistry and Physics in his last two years, as he naturally planned to do, if he was of a scientific turn of mind.

Two years ago Detroit Central and Grand Rapids Central recognized the demand for graduate courses of college grade, and by cooperation with the University organized courses paralleling those offered freshmen in the University.

This organization involved two definite elements—first, the question of adequately prepared instructors, and second, the question of actual content of the courses offered.

Detroit Central met the first situation by electing as head of the English Department a man chosen from the teaching staff of the Rhetoric Department of the University, and when a new head was called for the Physics Department, he too came from the University staff of Physics men.

In practically every subject offered for college credit, the teachers are of mature experience, * * * have done graduate work themselves, or have already taken either the Doctors or Masters Degree.

The work as now outlined consists of courses in the following subjects: Latin, French, German, English, Spanish, Chemistry, Physics, Botany, Zoology, Algebra, History. The text books used are those in use at the University of Michigan or other Class A colleges, and in practically all cases the students are in separate classes for instruction so that there is no mixing of the high school and college students.

The standard of work required is much higher than that of the senior year, so that the one-time criticism that the high school could not hold to the standard of the college and University has been proven unjustified. The other main criticism to the effect that it would be very difficult for the instructor to shift from the high school class to the college class in a period of a few minutes was also a fallacy because there is far less difference between these young men and women and the high school senior, than between the same senior and the entering ninth grader, yet every teacher makes this transition several times a day.

So much for the causes underlying the work and the method of organization. The next question that will occur to you is, "How has the matter worked out?" For most of the courses it has been only a matter of adding a few college text books and shifting instructor's classes to the best advantage. For the Science courses it would have been quite impossible in anything except a large and well equipped high school. Fortunately for the Biological work, most material is of a kind that can be readily obtained and at relatively little expense. We were well supplied with material for high school classes and except for those things which had to be imported, such as charts and models, we could get the things we lacked. So far as microscopes, chemicals, lantern slides, and lanterns were concerned, we had a larger supply than the average college, so that the total additional cost was relatively low.

As to the effect, so far as this brief period enables me to discern an effect—upon the high school and the courses in Biology offered there—

First, the fact that the younger students see a group of older students, most of them young men who are purposeful, ambitious to succeed, eager and interested in their work,—means an increased respect for learning for its own sake—the thing that we so regret, as an almost negative quantity in the adolescent boy. There is hardly a day when some one of my younger boys does not ask me, "What are the college fellows doing?" and this inquiry is not made from desire to kill time or to divert my attention to another subject, because it is usually a private inquiry made as I am working with an individual student. I have encouraged this by showing the younger sections drawings made by the college section and while I do not offer this as an explanation, I am getting a far better grade of work from my present boy's class in the second semester of High School Botany, than I have ever had in a boy's class before. While I am speaking of this class let me say that the corresponding girl's class has not shown any particular interest in the work of the advanced students and the high school boys of relatively the same age and school classfiication are doing 25% better work than the girls, yet both boys and girls came to me prepared by the same teacher. There may or may not be an inference to be drawn here.

In addition to the interest aroused by the older group working in the same laboratory I am going to try the device of having each of the older group responsible for one of the younger fellows in field work. The older man will be quiz master and the younger boy will in turn put the college man in a position where he will have to know what he is talking about. The field notes of the two will give me a double check and my own quiz will clinch any doubtful points in my own mind.

As to the effect upon the teacher and the course of study. As I have stated the course is too new to have brought about any radical change as yet. It is interesting to note, however, that while Miss Stearns of Grand Rapids and I have not discussed the matter in detail since the work was organized, we have reached certain mutual conclusions.

The first of these is the same thing that I have previously advocated before this body:—

That the high school course in Botany, in the second semester, should be less of an imitation of the beginning college course.

That high school Botany, even in the large cities, should contain some of the practical things, if for no other reason, than to give the city child some appreciation of where his food supply comes from, of its value to the nation as a whole, and respect for the farmer as an indispensible factor in civilization.

That high school Botany should include more Plant Physiology and less compound microscopic work on detailed structure and plant anatomy.

That the high school course in Botany should include some knowledge of Forestry, not because the boy or girl is going to be a forester, but that they may have an intelligent idea of what we mean by conservation and why some resources must be kept in the hands of the Federal government rather than those of individual or even state owners.

That the high school course in Botany should include, for the city child, some knowledge of shrubs and trees and plants desirable for planting the home grounds. This should include not only the names of the plants but their periods of bloom, questions of hardiness, of protection for the semi-hardy, fertilizers: culture, including grafting, budding, and preparation of cuttings—in other words the things that everyone wants to know about the plants in his own home grounds.

I have given very little space to the Zoological side of the matter because there is less duplication of work there than in Botany, and because I feel that I am not in a position to discuss a subject which I am not teaching.

From my point of view then, the Junior College in connection with a large and well equipped high school, is its own justification. It reaches a class of students who might not be able to go to college at all, if this work were not available in the public school. It tides over the student, who for any reason is not quite ready to enter college and it adds inspiration to the high school student, through contact with more mature and more purposeful students.

If in time it also brings about a modification of the high school course, which is better fitted to the minds of tenth grade students, than the present course, we may be very glad that it was thrust upon us, even though we did not especially welcome it at first.

In time if it grows to sufficient proportions, we may come to have Junior Colleges on the plan of the Crane Junior College of Chicago, as a part of the regular school system in every large city and if this means added opportunity, as it must, for the poorer but more ambitious and sincere part of our student body, I am sure that you will agree with me that we should welcome the idea of the Junior College.

CROSSING-OVER.

PROFESSOR W. E. PRAEGER, KALAMAZOO COLLEGE.

About 40 years ago the improvements in the microscope and the discovery of sectioning and staining methods made us acquainted with those mysterious bodies—the chromosomes. Soon after their occurrence and something of their behavior had been determined Roux suggested that they might be associated with the phenomenon of heredity. Weismann followed with his famous superscientific speculation. He accepted the chromosomes as the bearers of heredity, affirmed the critical nature of the reduction division and proposed an elaborate architectural plan the determiners of heredity being the material units that were grouped in various ways to build up the chromosome.

For 30 years that part of Weismann's hypothesis that related to chromosome structure was productive of much thought and criticism and occasionally of ridicule. Progress was made in our knowledge of nuclear structure, of the germ cells and of ontogeny but the structure of the supposed bearers of heredity was still beyond our reach.

But light was to come from an independent and unexpected quarter. As soon as the results of Mendel's experiments were understood, and they had been confirmed by his followers, it was recognized that a certain parallelism if not an accordance existed between the so-called law of Mendel and the hypothesis of Weismann. The continuity of the germ plasm, the purity of gametes, segregation of unit characters or determinants and so forth all seemed to fit in very nicely, but that part of the theory that related to the details of chromosome structure was still outside the possibility of experimental approach as it was beyond the power of the microscope.

My business here is to bring before you, as briefly as possible, the results of a very remarkable series of experiments, conducted along Mendelian lines, and yet, if the hypthesis should hold, throwing great light on the ultramicroscopic structure of the chromosomes.

In 1906 Bateson and Punnett, in experiments with the Sweet Pea, observed what is known as linkage or coupling. That is to say, in the shuffling of units that takes place with each generation two apparently discrete characters would always appear together. Soch characters were said to be linked. Later other cases of the same kind were noted by several observers but the numbers were not large and there was no evidence that would relate linkage to chromosome structure. The theory of reduplication proposed by its discoverer, Bateson, to explain linkage ignored the chromosomes.

The belief in the specific identity of determiners of heredity characters with chromosomes or parts of chromosomes received a great impetus when the sex chromosome was discovered thru the labors of Wilson, Morgan, Stevens and others. Here the identity of a particular chromosome was

proved and its function determined. Later the separate X chromosome was found not to be of universal occurrence but that the determiner for sex was located in a certain chromosome seemed to be so well established that probabilities made it universal. Now thru breeding experiments and statistics several cases of sex linked characters were well known. As examples color blindness in man, and the color of certain races of cats, fowls and moths might be mentioned, and as sex was determined by the mechanical structure of a certain chromosome it seemed logical that these other characters were related to it in a like manner. It suggested at once that the whole phenomenon of linkage or coupling simply meant that the factors for the linked characters were in the same chromosome.

The study of linkage presents peculiar difficulties. While the organism may be considered an agglomeration of unit characters few indeed of these characters are definite or separable enough for the purposes of experimentation, and while the numbers of inheritable characters must be very large compared with the number of chromosomes the characters that could be worked with in any species are usually fewer. Remember that if 20 pairs of chromosomes are present there will be over a million possible kinds of germ cells in the F 1 hybred generation.

In experimental genetics a great deal depends on finding suitable material. If Mendel's work with Hieracium had preceded that with the pea would his name be as well known as it is today? To successfully grapple with the problem of linkage in relation to chromosomes there was needed an organism whose *generations were brief, chromosomes few* and *mutations frequent.* These are very unusual conditions and yet they are all met in the fruit fly—Drosophila ampelophila; and what is more, in Morgan and his associates were a group of workers fully able to take advantage of the possibilities. When we learn that over half a million of these flies have been bred under control we will be satisfied that the figures are large enough to apply with safety the statistical method.

Drosophila has only four chromosomes in the germ cells and these differ in size and shape so as to be identified with comparative ease. Now according to the theory that the factors for linked characters are in the same chromosome, such units as could be differentiated should occur in four groups and no more. Wherever a mutation was found that could be used in crosses the problem could be approached, and the characters thus studied by twos and threes could be arranged wherever linkage was found and four groups of linked characters should be the outcome. This is what has actually been done. In the largest group are over 50 characters, that have been recognized, in the smallest only two.

The large number of mutations that act as unit characters found in Drosophila make it possible by applying Mendel's methods to establish the condition above described. If two or more factors are found in the same chromosome, there will be formed equal numbers of gametes containing these two factors and of gametes containing their allelomorphs. This must

continue as long as the chromosomes reappear intact with each generation of germ cells.

Unfortunately for the integrity of the chromosomes this is not the case. Not infrequently it will be observed that a pair of characters, normally linked, separate and appear in the F2 generation in the company of characters with which they are not usually associated, while at the same time the allelomorphs appear in the place vacated by the first mentioned characters. Now it is evident—on the basis that determiners exist in a definite order in the chromosomes—that if pieces of homologous chromosomes interchanged the result would be a crossing over of this nature.

There is some evidence from cytology that such an interchange takes place. During the early part of the proliferation of the germ cells homologous chromosomes have usually no special relation to each other, but at the maturation period these chromosomes arrange themselves in pairs, unite and then divide again. As to the details of this proceeding there seems to be some variation and plenty of difference of opinion. Usually the two chromosomes advance and retire in an orderly manner, but occasionally they will be observed to hook together or even to twist around each other in a fairly tight spiral. At such a time if the chromosomes were unable to disentangle themselves, but broke apart, a corresponding fragment of each crossing over instead of retiring with its original group we would have the mechanical basis required. Several observers believe that they have seen in the form of the chromosomes following synapsis that this has actually taken place.

Perhaps if I explain these charts this will be clearer. (Four diagrams exhibited.)

But the results that may be reached from a study of crossing over do not end here. It is evident that the chance of crossing over occurring between any two points will be greater the further they lie apart in the chromosome. If near together only rarely will the break happen to come between them, if at opposite ends of the chromosome any crossing over will affect them. Now in the enormous number of generations of Drosophila bred under control by Morgan and his fellow workers it has been determined with fair accuracy the per cent. of crossing over that will occur and the relative per cent. between the crossing over of any two characters. Then by using the percentages as units of measurement the characters involved may be located at the proper distances lengthwise of the chromosome. Thus the four chromosomes of Drosophila have been mapped for those characters that it has been possible to study by Mendelian methods. (Diagram of chromosomes of Drosophila exhibited.) We must agree that the ability to definitely locate the factor for a given unit-character at a particular point in a chromosome is a remarkable and unexpected result of experimental breeding.

It seems that occasionally a complication is produced when at synapsis the entangled chromosomes apparently break in two different places, an

analysis of a sufficient number of such cases of double crossing over explain facts that might at first appear to invalidate the whole argument. Another irregularity that is related to crossing over is when at the period of synapsis the two X chromosomes fail to disjoin and both either enter the egg or pass out in the polar body, but these cases cannot be discussed now.

We have thus come to conclusions regarding chromosome structure that apparently agree in general terms with Weissman's famous hypothesis. Yet the details differ and if we will but look at the problem in a broader way we will see that we are far from it. The mechanical conception that heredity is absolutely determined by organized self-propagating germs strung together to form chromosomes is far from what our present knowledge can approve. To allow a broader view and greater flexibility in our conceptions the word "determiner" may be dropped and "factor" substituted, tho it would be outside my subject to discuss here the contents of the factor hypothesis.

In ontogeny—and the study of heredity is largely comparative ontogeny —chromomeres, chromosomes, nuclei, cytoplasm and cell contents all may play some part. We talk glibly of heredity and environment as tho they were contrasting forces as clearly defined as plus and minus, but they are much more easily separated in theory than in practice, for among living things neither can exist without the other and their potentialities in ontogeny cannot be assorted. As in trigonometry the sine and cosine have no existence save in the relations of certain lines and angles, so the factor of heredity better be conceived of as itself unknown but existing in the interrelations of several elements of which the chromosome is the best known and most obvious.

And let me remind you in closing that the plan of the chromosome as determined by crossing over is a theory or chain of theories to account for a limited number of observed facts. Even with our present knowledge some things are by no means clear. What light further facts may bring we do not know and as all proof is lacking the facts may yet be explained by some other method.

THE RELATIONS OF CHROMOSOMES TO SEX.

PROFESSOR ROBERT W. HEGNER, UNIVERSITY OF MICHIGAN.

Everyone is interested in the subject of the determination of sex, and when in 1902 Prof. C. E. McClung suggested that the so-called "accessory chromosome" might be a sex determinant, the attention of cytologists in general was directed toward the study of the history of this body, especially during the maturation of the germ cells.

Up to the year 1891, the statement was universally accepted, that the individuals of every species contain within their cells a definite even number of chromosomes, but in that year Henking demonstrated the fact that in the bug Pyrrhocoris one of the chromosomes does not divide in one of the spermatocyte divisions, but passes intact to one of the daughter cells, and hence into only one-half of the spermatozoa. No special interest was evidenced in this discovery at that time. Paulmier in 1899 observed similar phenomena in the squash bug, and since then the literature of cytology has been crowded with studies on chromosomes with special reference to the relations between the accessory chromosomes and sex.

For the most part, our knowledge of this relationship is due to the researchers of American investigators, particulaarly Montgomery, McClung, Stevens, Wilson, and Morgan. At the present time the ordinary chromosomes are called "autosomes," whereas those that are concerned in some way with the determination of sex are termed "sex chromosomes." The latter are of two principal sorts, (1) the "X chromosomes," of which there are generally two in the female and one in the male, and (2) the "Y chromosomes" which normally occur only in the male and may be absent. The first sex chromosomes were discovered in insects, but very soon they were found in animals belonging to other classes and phyla, and they are now known to occur in hundreds of species belonging to many different phyla.

There are two principal types of animals so far as the presence and distribution of sex chromosomes are concerned. In the more common type, the male is heterozygous for sex, that is, only one X chromosome or one X and one Y chromosome are present in the somatic cells and spermatogonia, and after reduction has taken place, two kinds of spermatozoa can be recognized, one with the X chromosome and the other without the X chromosome or with the Y chromosome. The females of this type are homozygous for sex, that is, the eggs they produce are all alike so far as the sex chromosomes are concerned, each containing one X chromosome.

In the other type the conditions are reversed, the male being homozygous and the female heterozygous for sex. Here then there are two kinds of eggs, but only one kind of spermatozoa produced.

The clearest account of the chromosome history in any animal of the first type is that furnished in 1913 by Mulsow, who recently lost his life in the European war. He discovered in a worm, Ancyracanthus, that the chromosomes can actually be seen in the living germ cells, and was able to follow them throughout the entire periods of maturation, fertilization, and early cleavage. There are eleven chromosomes in the somatic cells and spermatogonia of the male and twelve in the somatic cells and oögonia of the female. The mature eggs are all alike, containing five autosomes and one X chromosome each. The spermatozoa are of two kinds; one with five autosomes and the other with five autosomes and one X chromosome. The results of fertilization were found by Mulsow to be as follows:

Egg		Spermatozoön		Zygote		Sex
5 autosomes + 1X	+	5 autosomes	=	10 autosomes + 1X	=	male
5 autosomes + 1X	+	5 autosomes + 1X	=	10 autosomes + 2X	=	female

Fertilized eggs of both sorts were observed by Mulsow, and in early cleavage divisions of eggs the chromosome number was found to be either eleven or twelve. Thus the sex of the individual that would have developed from these eggs could be determined at the earliest embryonic stage. There are many variations in the number and behavior of the X and Y chromosomes in different animals, but the final results are similar to that just described. Even in man both genetic studies and cytological observations indicate that there is some internal mechanism that controls sex, and that the chromosomes play an important rôle in this process.

Not only can it be shown that two kinds of spermatozoa exist in many animals with regard to the number of their chromosomes, but Zeleny and others have found that when a large number of the spermatozoa of an animal that is known to be heterozygous for sex are measured a bimodal curve results. This indicates that the spermatozoa are of two sizes—the larger presumably possessing one more chromosome than the smaller and representing the female producing element; the smaller, of course, being the male producer.

The second type of sex inheritance is that in which the female is heterozygous for sex and the male homozygous, that is, there are two kinds of eggs formed and only one kind of spermatozoa. According to the results of breeding experiments, this type includes certain butterflies and moths, and several birds—chickens, ducks, and canaries. The cytological evidence is not very clear in these cases. Guyer, for example, apparently has demonstrated heterozygosity in the males of chickens, whereas breeding experiments indicate that the male is homozygous and the female heterozygous for sex. In a moth, Phragmatobia fuliginosa, the evidence obtained by Seiler in 1913 seems to be irrefutable. The eggs of this moth are of two kinds, one containing twenty-eight, the other twenty-nine chromosomes. The spermatozoa all possess twenty-eight chromosomes. The fertilized eggs are therefore of the two following sorts:

Egg		Spermatozoön		Zygote		Sex
28	+	28	=	56	=	male
29	+	28	=	57	=	female

The crhomosome history in hermaphroditic animals is of particular interest, especially in those species, such as certain worms, that have a dioecious period in their life cycle. Animals such as plant lice are likewise of great importance because they pass through both bisexual and parthenogenetic stages in their life cycles—stages that are correlated with peculiarities in

chromosome distribution, but the short time at my disposal will not permit me to discuss these cases.

One of the speakers this afternoon has discussed the hypothesis that various factors reside in the chromosomes, and that these factors are arranged in a linear series and located at definite points. Sex seems to be inherited just as are other characteristics, but thus far the factor for sex has not been located at any particular spot in the sex chromosome, since "it has not been possible to determine the linkage relation of the sex factor or factors to other factors in the sex chromosome, because crossing over of like factors in the homozygous sex would lead to no visible effect, and in the heterzygous sex no crossing over takes place." (Morgan, Sturtevant, etc., 1915, p. 93).

A fact of much interest regarding the sex chromosomes is the indifference of the Y chromosome. Breeding experiments seem to prove that no mutations have occurred in the Y chromosome and that it does not contain any factors dominant to any known mutant or normal factors in its mate, the X chromosome. Furthermore, Bridges has shown that in certain cases the two X chromosomes may remain together at the time of reduction and that this non-disjunction results in female individuals containing two X's and also a Y. The formula for such a case is as follows:

$$\overbrace{3 \text{ autosomes} + 2X}^{\text{Egg}} + \overbrace{3 \text{ autosomes} + 1Y}^{\text{Spermatozoön}} = \overbrace{6 \text{ autosomes} + 2X + 1Y}^{\text{Zygote}}.$$

In conclusion it may be stated with a high degree of certainty that sex is determined by some internal mechanism, and that this determination in many animals the distribution of the chromosomes. If a single X chromosome is present, the egg develops into a male; if two X chromosomes are present, the egg develops into a female. Factors in the animal's environment or in the environment of the germ cells within the animal itself may influence the distribution of the chromosomes, but the known facts all tend to prove that the sex chromosomes form one link in the chain of events which are involved in sex determination.

PHYSIOGRAPHY CONFERENCE

THE CONDITION OF GEOGRAPHY IN THE HIGH SCHOOL AND ITS OPPORTUNITY.

DR. CARL O. SAUER, UNIVERSITY OF MICHIGAN.

In most high schools geography is the most recently introduced science. Physiography, or earth science, which was the first branch of geography to be taught, is almost entirely a development of the last twenty years in the high school. Its successful establishment in secondary schools was due to the development in the nineties of a vigorous group of university physiographers, two of whom, Tarr and Davis, wrote the first elementary texts which combined modern scientific content with a simple and attractive manner of presentation. A period of marked growth in physiography instruction at the turn of the century resulted. Since then, however, a general reaction has set in. In some sections of the country physiography is holding its modest place in the curriculum, in others different forms of scientific instruction, most particularly general science, are being substituted. The question is therefore: may geography redeem its position by remedying the deficiencies which have been discovered in physiography as taught at present, must geography give way to other branches of science or to a compendium of science as a whole, or will geopraphy meet with better success if some branch other than physiography is chosen?

An inquiry into the reasons for the relative failure of physiography discloses immediately two causes, lack of properly trained teachers and an impression that the course lacks general practical value. For this condition the training schools, principally the universities, are in part responsible. The propagation of the subject has been in the hands of a relatively small number of university men, a much smaller number of instructors than is the case with any other science generally represented in the high school. The number of teachers who could be trained for the secondary schools has therefore been much smaller than in the case of biology, physics, and chemistry. The position of the science in the university has not been determined so much by its possible value to teachers or to a general education as by its function as a preparation for geology. The subject has developed consequently chiefly along the lines of dynamic geology with the result that little stress has been put on the broader, geographic applications of the science which fit it for the more general needs of the elementary student. This geologic bias has seriously hampered the development of the subject in the high school. The number of teachers available has been thereby reduced and few of them have gone out into high school work with an emphatic idea

of the value of physiography to an understanding of agriculture, forest conditions, transportation, and other types of industry. In large part physiography has not even been taught so as to aid in the appreciation of landscape. With some laudable exceptions therefore the chief non-geologic value of the subject has been for its excellent training in the interpretation of scientific observations and in straight thinking, excellent results, to be sure, but hardly sufficient to win the support of high-school principals of today.

Minor causes have contributed to the failure of high-school physiography. In some places, instruction in the subject has not succeeded because there has not been enough local material to illustrate adequately physiographic processes. In Michigan this condition is much less true than in some parts of the Middle West, most particularly in the prairie regions, with their monotonous topography and nearly uniform soils. More commonly the failure has been due to a failure on the part of the teacher to recognize that his laboratory does not consist primarily of maps and models and cross-section paper, but of all out-doors. Field trips require initiative, and the teacher may be overworked without adding this task to his already numerous duties. They also raise new problems of discipline. Properly managed however they are the best stimulus to an understanding and appreciation of the subject. The lack of these first-hand experiences has damned many a physiography course to the monotony of text-book recitations alternating with the tedious busy-work of unprofitable drawing-lessons. Probably in the majority of cases the greatest stumbling-block has been the study of climate and weather, commonly comprising at least a third of the course. As presented in the hands of most inexperienced teachers, this part of the study becomes a veritable nightmare in its confusion of ideas and in its drudgery, and not uncommonly kills the interest in the entire course. For the average class and the average teacher it would be better to eliminate most of the technical meteorology and mathematical geography. Students will have received the important ideas if they can be made to understand the change of the seasons, the relation of relative humidity and evaporation, the causes of rain, and the cyclonic control of weather. With very rare exceptions high school graduates under the writer's observation have had no conception of these most fundamental climatic principles.

Because physiography has not developed the practical values inherent in the subject of geography and because it is also open to the other objections mentioned, other phases of geography have been proposed to take its place. The three forms which have attracted serious attention are: commercial geography, general principles of geography, and regional geography. All of these are a study of life in reference to its environment; the emphasis is shifted from the inanimate world to the animate world. It is true that in all of them the best teaching requires training in physiography and also in anthropogeography. But it is also true that these subjects can be presented with fair success by a teacher who is not thoroughly grounded in the tech-

nical phases of physiography and that consequently there are less likely to be teaching failures in these lines. These subjects also make a more general appeal to the student because of the lesser amount of technical material, and because in them geographic principles are applied to practical life. From one standpoint these branches are simply the application of physiography to economic conditions. Due to their interesting contents and obvious value, these "humanized" forms of geography are winning their way rather rapidly in the high schools of the country.

The first of these more recent forms of geography to be introduced into secondary schools was commercial geography, the study of the production and exchange of the commodities of commerce. Its development in this country was in part in response to the success of this type of instruction in Europe, most especially in Great Britain. Ground was broken most particularly by the text of Adams, published in 1901. The practical information which this course gives regarding the world's work and the drill which it affords in place geography has won for commercial geography a position not alone in commercial courses but in non-vocational high schools as well. The subject is at present well organized for presentation in the high school, the chief difference of opinion which remains being as to whether it is preferable to make the commodity or the region the unit of study.

The fundamental importance of geography in the grades and its recent successful introduction in advanced form into the universities and colleges leads to the conclusion that it should find representation in some general form in the high school. This need of a high school course in the general principles of geography has been the subject of discussion at various meetings of educators, most notably at the National Education Association, and by the Association of American Geographers. The task was first undertaken by Dryer, who published his High School Geography in 1911, and by Salisbury, Barrows, and Tower with their Modern Geography, published in 1913. It is perhaps not too much to say that these two texts mark the most important innovation in high school geography to date. The great service which these pioneer texts are doing in hewing out the path of the "new geography" finds a practical appreciation in the extensive use which they enjoy after having been on the market for only a brief period.

The new type of instruction attempts to give a general view of the relations of life, most particularly of man, to environment. The major part of the content of physiography remains, but life responses are added. In this study physiographic processes are not considered as being of themselves of importance, but they are studied primarily in order to derive a systematic understanding of the environment in which man moves. Those items of physiography therefore which have little or no bearing on life are eliminated. From the standpoint of environmental influences such things as peneplains, subsequent and antecedent streams, eskers, drumlins, ice ramparts, and many others are of little significance. Land forms, as plains, plateaus, and

mountains, and their conditions of life, constitute an important topic. As climate is one of the most important geographic factors climatic influences and types of climate receive a great deal of attention, however with the suppression of much technical meteorological material. As soils determine in a most important way conditions of agriculture, of forest growth, and of transportation, the study of soils and soil influences should be an important part of the instruction in general geography. Mineral resources constitute a group of extensive geographic influences in their bearing on the distribution of population and the nature of industries and should receive adequate attention. It is doubtful whether a high school course in geography can profitably attempt to do much more than to give a working knowledge of climate, of the surface of the land and the processes which shape it, of the ocean, and of the mineral resources in their relations to life. These things can be done efficiently within the limits of time available. Elaborate applications of the sum of these geographic factors upon life introduces complications which may lead to confusion. The texts now published attempt to summarize their geographic instruction by final chapters of this sort. In the one instance the distribution of the human species and of plant and animal life and the principles of commercial geography are introduced. In the other instance, such topics are taken up as, the distribution and development of the leading industries of the United States, the distribution of population, and the development of cities. It is questionable whether sufficient time can be given to these broadly-designed summary studies, or whether they tend to cloud the effects of the whole course by the quantity and complexity of their material. The verdict is being formed now in many class-rooms. In the meantime the suggestion is offered that after the relationship between individual geographic factors and life has been properly established the work may be simply and adequately summarized by work in home geography, the locality in which the course is given being considered as the unit of geographic study. Here is a splendid opportunity to plan profitable field trips and to view the influence of the sum total of geographic factors upon the home of the student.

Experiments are being made at present with courses in regional geography in the high school. Their principal purpose is to keep fresh and to expand the geography which has been learned in the grades. An objection to this type of instruction is that it is substantially a repetition of grade school work and introduces no new view-point. Place or regional geography can be taught very successfully in connection with both commercial geography, especially if taught on the regional plan, and with general geography as it has been outlined above. It is entirely appropriate that in the teaching of either type of high school geography a number of regions be chosen to illustrate geographic principles. If this is done all the place geography desired may be introduced without running the risk of making it a wearisome encyclopaedic sort of study.

The salvation of geography in the high school lies in the development of general and commercial geography. Of the two the general course will fill by far the more responsible position in the curriculum. It includes all the most important teachings of physiography, and its interest is heightened by its application to the living world and especially to human activities. Its nature is cultural in the fullest sense in that it tends to give a world outlook. It should have as its great laboratory the home environment, which may be used quite as fully and successfully as in physiography or biology. General geography should provide as well a review in attractive form as locational geography. Is not this the solution of the general science problem? Here is a course of the broadest possible scope, thoroughly scientific in its content, consistent in its organization, linking earth science and biology, and with manifold applications to economic conditions. If all those who have the interests of geography at heart will co-operate loyally they can assure in time the general recognition of this course as a fundamental elementary science for the high school. Physiography will maintain itself as a more advanced elective course. Commercial geography will have at the least an important place in its proper vocational department. By giving our support to this grouping of the field of geography we can win for it its deserved place in secondary education and help to eliminate some of the will-o'-the-wisps that at present are disturbing the science situation in the high school.

ART CONFERENCE

ART TEACHING IN HIGH SCHOOLS.

JAMES PARTON HANEY, DIRECTOR OF ART, HIGH SCHOOLS, NEW YORK CITY.

Dr. Haney presented his address with many illustrations made on large sheets of paper, in colored crayon and in tempera. He also used two sets of lantern slides, the first showing the development of a course of study in an academic high school; the second, a course developed in the Washington Irving High School, for girls, in New York City. The latter is a high school which presents an industrial art course, two years in length, especially arranged for students who are to be prepared as professional workers for "the trade." Presented in this form, a complete transcript of the paper cannot be given. What follows is an abstract of certain of the points presented, with a more complete statement of the methods of study pursued in the industrial art course referred to.—EDITOR.

Every high school sees included within its numbers a large group of pupils of moderate ability and a small group which may be trained to technical execution of a high order. For this reason every high school art teacher must concern himself to meet the needs of these two classes—the many, and the few. For the many, the aim should be to employ the subjects of the course of study in a way to meet aesthetic needs, to render the pupils "aesthetically reactive" to their surroundings. These needs are never to be expressed in terms of technical execution, but always in terms of taste.

For the few, the purpose should be to develop a technical execution of a high order, that they may be led to conserve their talent and develop it in the specialized courses of art schools. The high school should, therefore, present not one uniform course of study. The many need a course which shall train them in appreciation, the few, a course which shall train them in skill.

CLASS TEACHING AND CO-OPERATION.

A frequent shortcoming in the teaching of drawing in secondary schools is the endency to make the process one entirely of individual instruction, to neglect class teaching, exalt the work at the expense of the pupil, and lead the latter to view his lesson as one in technique, rather than one in which reason should play a constant part.

In any considerable group of high school teachers, monthly conferences should be held, in which methods of teaching should be reviewed. Each conference should look to see one or more lessons developed by a teacher whose methods have led to success in the class room. With these lessons

there should be presented an exhibition of some of the best class work the speaker has been able to secure. This will serve to keep desirable standards of execution continually before all members of the group.

As an element in promoting co-operative effort, means should be developed by every high school teacher to secure an exchange of work between his own classes and those of other instructors. The work referred to may consist of drawings and designs, or other work of merit. Collections of selected examples thus exchanged and hung for a brief period in the class room serve to acquaint the pupils with high standards secured elsewhere. They promote interest and emulation, and serve to make plain the technical standards which may be secured by skillful workers.

The Training of the Many in Taste.

To develop any general spirit of artistic appreciation, the teacher must teach through an art applied. Taste is not to be taught by talking about it, but by the effort to create pattern appropriate to the material and form to which they are applied and to cause the pupils to see the laws of good design throughout their surroundings.

The most satisfactory introduction to the subject sees its development about some "center of interest," as "dress," "home decoration," etc. Girls classes may thus study art in color and pattern, as related to the clothes which they wear, mixed classes may develop schemes of household decoration, while manual training schools follow problems related to constructive processes, and commercial schools, problems grouped about the subejct of advertising.

The lessons which this form of approach make possible, can each be made to develop taste in definite fashion. The making of a curtain or table cover will serve as an introduction to a discussion of the proper furnishing of a home. The designing of a belt or brooch will lead to the study of dress, with questions of patterns, stuffs, colors, and personal adornment. The scheming of a school poster may similarly tend to a discussion of the advance which has taken place in commercial art, the country over, as shown in the magazines, the street cars, and in the well-dressed windows of the foremost shops.

All this is an art practical, not theoretic. It raises questions of interest to all students, questions to which their growing sense of appreciation can be directly applied. Taste is found to be a matter of choice, a power increased by each effort to distinguish between lines good and bad, forms fine or ugly, colors crude or harmonious. Text-books are not yet to be had which give this knowledge in form readily available for school use. It must, therefore, be given at first hand, partly by word of mouth, partly by clever questioning, and partly through the student's own effort to create beauty in the problems he must solve, or to appraise it and appreciate it, in the pattern, picture, statue, or building, which he studies.

Steps in Design Lessons.

The steps in each lesson in design should pursue a general plan. This may be stated as follows: (1) The determination of the area to be decorated. (2) Decision as to the form of decoration, with consideration of the structure of the model, its function in use, and the nature of the material to be employed. The effort should be to secure differentiation in class work; that is, a number of different designs based on the same general problems should be sought. At first, only two general "mass arrangements" are suggested, but later, more individual solutions should be encouraged. (3) After the masses have been determined the question of their elaboration must be taken up. This will necessitate a discussion of the subject matter to be used; that is, the conventionalized forms which are to be adopted to the pattern. Much illustrative matter must be furnished the student at this point, that he may see in how many different ways simple natural material may be developed to fill the spaces he has devised.

Demonstration Drawing.

If there is one aphorism of more value than another for teachers of drawing, it is that which reads, "The best way to teach drawing is to draw." Every art teacher should learn to draw before his pupils, and should do so continuously. Each step of the way should be shown, and as far as practical, shown with the same media that the pupil is expected to use, but shown large, that the details of technique may be made plain.

Good demonstration drawing requires much practice. It should have assurance on the craftsman's part underlying every line. To secure this, it is necessary that the instructor drill until he can foresee in the sense of actually visualizing the form which he draws, before he draws it. This clarifying of the mental image is as much a matter of drill as is the manual dexterity which comes from practice with crayon and brush. Every teacher possesses the power to think and see, mentally, to a greater or less degree, but each can do so better with practice.

Call to mind, for example, the most familiar of things—try to imagine it upon the paper before you. Instantly you will discover that what you thought was a clear mental image, is all "fringes"—scarce a line stands out, and if the form, itself, is near, you seek to reassure yourself of the true proportions amid the perplexing mist your image proves to be. A long glance at the form and you turn back with the outlines far sharper than before. Two or three elements, at least, you can remember—but you soon must turn again to the model for fresh aid and definition of your mind's picture. Thus the first steps in the building up of a permanent mental image are taken. Continued drill makes the mind expert at retaining images, so that in time the demonstrator can call up at will, forms he has not seen for months, can fancy these, as it were, hanging in the air before him, can

turn them, mentally, this way and that, and when the desired image is before his eye, can "project" it upon the board in size big or little, as occasion demands.

One other thing will help substantially. This is a knowledge of the "construction" of the form to be drawn. The draftsman must, in other words, know the way the parts fit together—how spout joins pitcher, or arm joins shoulder. This knowledge will aid much when the mental image is dim, for it will enable him to say what must be true of any part when it is in this or that relation to its neighbor.

(Dr. Haney, in connection with the foregoing, made a number of drawings of animals, figures, etc., illustrating the process of visualization, projection and construction.)

Representative Drawing.

The primary aim of work done in Representation—so-called "model drawing"—is to teach the pupil to see. He should be led to study the model, carefully, and should learn from this observation the principles of foreshortening and construction. As an additional aim, the instructor in representative drawing should seek to present well-placed groups of objects as models, and to emphasize the principles of good arrangement in these drawings. These principles form the study of "composition."

Particular emphasis should be laid upon the "reasoning out" of principles in their application to particular problems. Pupils should be led to criticize their own work by being called on in class to state and apply principles. The class room recitation should form part of every lesson in drawing.

As far as possible, the differentiation of class work in this form of drawing should be developed as in the case of design. This means that pupils should be advanced as rapidly as their individual skill will permit. Every effort should be made to break the lock-step of the older drawing courses, where every pupil in a class drew from the same or similar models. Many groups should be used and different media may even be taken up by different pupils. The advanced workers always serve as a stimulus to their slower mates.

(Dr. Haney here made a number of drawings illustrating the steps in the development of lessons in representative drawing and design. He then showed an extensive series of slides, illustrating his suggestions regarding the differentioation of the teaching of design and representative drawing in academic high school courses.)

Training for the Few.

The trend of the modern high school is toward specialization. The older academic school, with its general course of study, is being replaced by the school specifically designed to serve the needs of some special class of

students. Commercial and mechanical high schools have thus come into being, and to these there has, in recent years, been added the industrial art high school.

The Washington Irving High School of New York City is a school which, under one general organization, includes both an academic and industrial department. The latter offers various courses in industrial subjects, one of which is industrial art. This course is designed to train for the trade girl pupils who have talent in drawing and are desirous of cultivating this to a point sufficient to enable them to earn a living as industrial designers.

These girls enter the high school at the age of fourteen, and for the first year follow a general high school course. This lays but little emphasis on instruction in drawing. At the end of this year, the pupil is given an opportunity to enter any one of a number of industrial courses (millinery, dressmaking, etc.), each of which is two years long. If she is possessed of talent, she may elect the industrial art course, and having done so, begins forthwith an intensive study of drawing, color, and design. She now gives two-thirds of her time to these subjects, studying them for nineteen periods a week, or what is practically equivalent to the entire morning of each school day.

The course thus pursued is the resultant of much carefully conducted experimentation on the part of the corps of art teachers. Illustrations which show the sequence of work appear in the slides which I show you, and there follows a statement of the principles which underlie this instruction. Primarily it is a course for industrial art workers, not for students of the so-called fine arts. It is necessarily brief, for the students must be graduated after two years' training. It is necessarily limited in scope, for the positions open to young woman designers are, as yet, confined to a few branches. Its one purpose is to give its pupils training which shall enable them to secure, on graduation, a position in the trade. Two things it must, therefore, seek to do: first, give technical skill; second, give individual power. The test of the value of each exercise must be made in the light of these conditions. Each must, in other words, raise a high technical standard, and each must require the pupil to work independently, and with emphasis on the individuality of the product created.

Learning to Draw.

The fundamental principle which underlies the work is one which advocates the study of but a single subject at a time, and this intensively. As the pupils on entering the course are but fifteen years of age, and as their knowledge of drawing is limited, the first half year is given up entirely to the study of form. Every effort is made throughout this term to cause the pupil to see good drawing as the first essential to professional success.

The objects drawn in the preliminary lessons are the familiar utensils, boxes, and vase forms, of the ordinary high school class-room, but advance is made from these as soon as the pupil has become familiar with the tech-

nique of line drawing in pencil. The models are next presented in more difficult positions and questions of construction and foreshortening are discussed and illustrated by the teacher. Light and shade are then taught, first, through the study of simple block forms, and later through the rendering of still-life models in pencil and in wash. The student is also required to familiarize herself with the use of opaque water-color called Tempera. This medium is employed in rendering a variety of still-life models in color. More difficult forms are introduced as the members of the class grow in power and in technical skill. Flowers, shells, stuffed animals and birds are offered, some to be rendered in pen and ink, and some in elaborate pencil drawings, or in drawings in pencil combined with transparent washes of color.

The sequence of steps is one which in measure depends upon the skill of the learner; slow pupils are advanced slowly, apt pupils, rapidly, so that toward the latter part of the term the work becomes highly individual. Many models are now drawn, from half a dozen to a dozen different techniques being carried on at the same time by different students. The product of the best and most rapid workers is used as a stimulus for all the class. Every triumph of good drawing is praised and each member of the class is called on to observe in how many different ways and with how many different media the models of the class-room may be represented.

"Speed drills" are next introduced and quick sketches of all kinds are required from still-life models. This is a preparation for work from living forms. Memory sketches are drawn as a similar training, and when both eye and hand have become skillful in rapidly noting and recording the facts of form, the pupils are required to draw from living animals in the school's Zoo. Here before the cages they sketch the rabbit, the fox, the guinea pig, or the monkey. They endeavor to catch characteristic poses of squirrel or macaw, they make drawing after drawing of the prying white rats and of the fan-tailed gold fish.

Through this term's work thus runs one idea and one admonition: the idea, that the pupil shall continually improve in power to see and to record; the admonition, that the worker "look again"—look more carefully, judge more accurately, and note with increasing skill the refinements of construction, whether these appear in the heart of a flower, in the insertion of a wing, or in the most complicated voltures of a shell. Thus the entire school term is given up to learning to draw, and the pupil is not for a moment permitted to forget this aim.

The Study of Design.

In the second six months of the industrial art course, the pupil studies the principles of color and design in the same intensive fashion which marked the previous study of drawing. The primary idea which underlies this work is that, natural forms, which have hitherto been studied merely as drawing models, shall now be seen decoratively. Every one of these forms is replete with pattern, but it requires the designer's eye to see this pattern.

For this reason the student now redraws the natural forms, but draws them with the elements of pattern emphasized. The simpler shells and animal forms are first used, each being translated into a highly decorative drawing. Some understanding of color is essential to success in this translation, and to gain this understanding, the pupil, before making these decorative studies, completes three or four color charts in which a study of hue, value, and intensity, is made in color scales. This is followed by a study of color harmony. The latter is made, first, through the copying of simple chintz patterns, and later, through the recombination of colors taken from the color charts and applied to various examples of all-over design.

It is not possible to recite in a few words the many details of color instruction given, but the most fundamental aspect of this teaching may be reduced to an aphorism which would read: "Color is to be taught through use." In other words, it is held that while color names and color qualities are best approached through the making of color charts, these alone give the pupil little power. The true significance of color is only gained after a host of experiments have been tried. These are best made upon small pieces of pattern designed by the student, and developed in colors which seek at once a brilliant and an harmonious result.

Thus it is, that after the color charts have been devised, and the decorative drawings completed from natural forms, the student is led to restudy the elements of these forms, with a view to securing from them suggestive motifs for pattern. To the untrained eye these elements are hidden, but as the pupil learns more and more to look for the decorative aspects of form, she learns to see in these spottings of light and dark, graceful movements of line and suggestive elements of pattern, which combined make borders, corner pieces, separate units, or all-over repeats.

The slides which are here shown offer examples of the plates made by pupils who have pursued this method. All of the originals are in brilliant and harmonious color schemes. Several examples are hung in the little exhibition on the neighboring wall. All these designs have been developed from a study of the forms shown in the decorative drawing at the top of each plate. The colors are original combinations devised by the students; the motifs come from scrutiny of the various details and markings of the several forms.

One of the most valuable erercises in connection with the derivation of motifs of this description is the making of what are known in the class-room as "freehand motif sheets." In this work the young designer sits with the model before her and half a dozen colors, with as many brushes, prepared for use. Without an underlay or other mechanical aid, she proceeds to spot in, in harmonious colors, combinations of lines and masses suggested by the model. If she secure but half a unit, it is possible for her, with the aid of a piece of looking-glass placed on a mid-line, to lee the unit as a whole. At times, two small pieces of looking-glass placed at an angle one with the other

will enable her to secure a suggestion for a novel radial form based on the lines and spots derived from nature.

This, in brief, is the plan of work pursued throughout the term. At first simple objects are drawn and simple patterns derived. As the work proceeds, more and more complicated models are employed and more and more complicated patterns are created. Similarly, the color schemes are carried forward; at first, in the simplest harmonies, but, later, in elaborate and subtle combinations of hues. No work done is from copy. The pupils have access to the work of other designers and may study the patterns made by professiosnal workers; but this study must be done apart from the patterns which they, themselves, are developing. Inspiration is obtained by examining the results of others, but the translations from nature into pattern must be the pupil's own.

The Study of Commercial Design.

After the first year's study of drawing, color, and the principles of design, the pupils are given an opportunity to choose between two courses. The first of these is called Commercial Design, the second Costume Illustration. The first gives practice in lettering and the study of pattern as applied to a variety of commercial products, the second, practice in the special techniques employed by the maker of fashion plates and the illustrator of fashions in the daily press. Through one or the other of these courses the young designer is trained for the general practice of the trade.

More highly specialized courses, as designing of wall papers, of stained glass, of carpets, oil cloths, or textiles, it has not been found desirable to present. In the brief time allotted to the courses, fundamental training in principles and in the use of various media is essential. Specialists in any one form of design, the school cannot hope to make in the brief period of two years. Each specialty requires for its proper practice an intimate knowledge of the materials and processes employed. This knowledge can only be gained by actual practice in the studio of the manufacturer. What the latter desires in the apprentice designer, is one who has been taught to draw with skill, to employ color with ease, and above all, to carry out directions with intelligence. This knowledge, power and discipline the school seeks to give.

The course in Commercial Design introduces the pupil to a study of lettering. The first exercises present the alphabet known to the printer as Gothic. The letters in this are without ceriphs and are made with a special "spoon-bill" lettering pen. Letter forms and proportions are thus studied in their simplest aspects. When these have been learned, and when through practice, the pupil has come to appreciate niceties of spacing and arrangement, the Roman alphabet is presented, and following this, a variety of modified letters derived from the Gothic and Roman forms.

With this elementary instruction in lettering, there are introduced commercial problems. These rapidly increase in difficulty from simple arrange-

ments for booklet covers and letter-heads to complex titles and the more intricate work drawn from the practice of the trade. The use of borders and decorative motifs now becomes necessary, and the student is led to see the value of the decorative study already made, when she is required to translate into pattern, manufactured objects to be used in advertisements and trade-marks. Examples of these different problems will be found on the slides which are here shown.

With the fundamentals of lettering thus learned in the third term of the course, the pupil is prepared to pass on to the fourth and last term. In this, various phases of advertising and commercial art present themselves. Color is freely employed and insistence is placed on the individual solution of each problem. The processes of reproducing drawings in the trade are taught and the student is exercised in the development of speed as well as skill, that she may be prepared to meet the trade demand for rapid performance.

The problems are now differentiated, not only to meet the capacity of different pupils, but to illustrate the variety of work which is found in the commercial workroom. So far as possible the atmosphere of the professional studio is developed in the class-room. The requirements of supposed customers are presented as they would be in practice. One purchaser desires a container cover for a cracker box, and wishes a picture of the cracker to form part of the pattern; another orders a car "ad" for a new cigarette and insists that the box appear prominently in his advertisement. Others still present different orders: for a holiday poster stamp; for a booklet cover for a steamship line; for a printed label to go upon a fruit can. These various problems are esayed by various pupils.

The earlier exercises are done by the class as a whole, each seeking some individual solution, but as the work progresses the exercises become more varied and to the more skillful workers are given individual problems which call forth highly personal solutions. One admonition is continually repeated: "Nothing is to be copied—the design must be original." Each exercise carries with it a demand that not one, but three or four sketches be offered by the student. The merits and shortcomings of each are reviewed by the instructor and the best is then developed as in response to the order of the supposed customer. On the adjoining wall will be found a variety of commercial designs which have thus been produced in class. These are all original designs, in which the objects shown were drawn from the actual forms.

Costume Illustration.

The pupils who elect to study costume illustration, pursue for a year a course parallel to that in commercial design. Its primary aim is to familiarize them with the techniques and methods employed in the fashion studio. Color plays a less important rôle in this work than does a knowledge of pen drawing and work in wash. A great variety of "handling" must be learned by the prospective illustrator, and with this study of techniques and tex-

tures, there must be made a study of the figure itself. This is fundamental and is not to be learned through the copying of stiff outlines in trade catalogs, or through the employment of conventional formulae for figure construction. It is a study which must be made from life, and must be developed with an understanding of the anatomy of the living model.

The students are, therefore, early taught to make sketches from the nude. This study is done in a studio outside the school, but under the direction of the art teachers. The essentials of artistic anatomy and of the proper construction of the figure are learned in connection with the living form and the pupils are taught to clothe their sketches with garments of the current mode. This gives to their work a vivacity and a spirit never to be found in the drawings of those who have learned construction from conventional rules and proportions. Proportions, of course are taught, but only after the student has studied these in the nude is she permitted to draw figures from memory. Thus all memory drawings are based upon previous study of the living model.

In manner similar to that followed in the study of commercial design, the learner is now presented with trade problems and trade conditions. The exercises range from the simplest "layout" of a page of under-garments, to the execution of a newspaper drawing in the "style of the season," or the completion of a fashion plate in the latest mode. Throughout this work it is recognized that the practice of the trade is highly differentiated. Some designers are employed only for "layouts," some for "wash," etc. For this reason the pupil who shows unusual facility in one technique is urged to perfect her method of handling, as skill in any one particular is a valuable trade asset. But this specialization is not permitted to absorb all her time. What is primarily sought is a knowledge of fundamentals, that once out of the school and in the commercial studio, the learner shall find herself familiar with the work required of the professional worker.

MANUAL TRAINING CONFERENCE

THE USE OF POWER MACHINERY IN GRADES AND HIGH SCHOOL.

MR. JOHN R. JENSEN, SOUTH HIGH SCHOOL, GRAND RAPIDS, MICHIGAN.

The use of power machinery in grades and high school is a subject that is so far reaching and one that has so often been discussed at the various round-table meetings that I question if I will be able to present to you any new thoughts that will add to the knowledge you already possess along this line.

You as educators expect a great deal of the manual training instructors in carrying out the work along certain indicated lines with certain view-points in mind. Some possess merit, others impossibilities.

It is not, however, for me to say what shall be done to arrive at a state of perfection but I may contribute something to the cause already established and be of some assistance in the subject in which we are all so deeply interested—mainly, the boy.

First, of vital importance, is to see that the boy is properly prepared to take the machine work when the proper time arrives. He must have the necessary hand training to appreciate the value of the machine instruction, as machine work is only a short-cut for hand work, enabling the operator to turn out the finished product with accurate precision in a much shorter space of time. It is therefore necessary that he be taught how to get out his stock with the least possible amount of waste material, to square up a piece of stock properly, and lay out his work such as joints and duplicate parts. This work should be compulsory in the 6-2, 7-1, and 7-2 grades.

In the South High School we have one large room in which the elementary and advanced work is carried on. This gives the boys in the lower grades a chance to observe a great many of the machine operations. As the lumber is furnished in the rough, these boys are permitted to feed this lumber into the planer. I wish you could see the pleasure the boys derive from an opportunity to be permitted to operate a machine. To appreciate the sensations of the boy operating a machine, let us take the buzz planer for example. How many are there here that have interested themselves to the extent of passing a board over this machine? I am safe in saying not many. We have in Grand Rapids a lady member of the Board of Education, Miss Agnes F. Chalmers, who experienced these sensations by operating several machines and she is undoubtedly in a better position to understand that the only way to appreciate the work is to actually do the work the boy does. After operating a machine the boy's interest has increased 100%. In

his opinion, he is a man. He is now ready to take the hand tools and get out his stock with increased enthusiasm.

In most cases the machine work is started in the eighth grade. The preliminary work on the machines consists of demonstrations. Everything pertaining to the machine is thoroughly explained, such as adjustments for the various operations and positions of hands and feet while operating. A graceful position while operating a machine eliminates danger, as accidents are often the results of awkwardness. The improper use of the machines is as essential as the proper use, as it places a boy in a position to see the dangers of careless operations.

For example: A boy operating a saw pushes a piece through and tries to return it in the same manner. The results are that by such a method a "kick-back" in most cases follows with serious results. This "kick-back" should have a practical demonstration but great care must be exercised on the part of the instructor. The same is true of the buzz planer. You, who are familiar with this machine, know that at both ends are adjusting wheels for raising and lowering the beds. Let us picture a boy passing this machine. His first thought is to give it a turn. His curiosity must be satisfied. What does this mean to the instructor? He has opened a way for an accident unless the boy has the presence of mind to examine the machine before operating and to notify the instructor. This gives us another chance to demonstrate the dangers of operating the machine in this condition. If the back table is let down and the head greatly exposed, a "kick-back" or a "tip-up" may result, letting the hands into the knives. This usually happens on short pieces. Similar cases might be cited for the other machines.

After such demonstrations the boy is ready to assume added responsibilities. He is brought face to face with the most serious problems he has yet experienced; he finds he must think for himself. He must apply processes as learned in the elementary hand work. He is now experiencing the strictest discipline since entering the industrial work. He appreciates the value of instruction as never before. He begins to realize the value of manual labor and is beginning to appreciate what constitutes a day's work. These added responsibilities create initiative. He is irresponsible until this stage is reached and must be continually watched.

Right here is where the instructor is tied to one boy. He must insist that the rules governing the operating of machines are carried out. Individual instruction is the only solution. Small classes of about twelve to fifteen are sufficient. But as the demand for this kind of work is very great the tendency is to crowd the classes which only retards the progress and safety of the boy. This point is of great importance and should be considered seriously.

The apprentice in a factory must learn the facts about the using of machines by coming in contact with the different machines, if he has that opportunity; otherwise, he must learn from observation which is sometimes

costly. For the poor boy that leaves school at sixteen to seek employment, this instruction is valuable. He is better prepared to adapt himself to the conditions as they come up. He has been taught reasoning and hand processes which I believe should be termed in this case Elementary Machine Work. Without the necessary hand work, such as planing and squaring up a piece of stock, making the several joints universally used in construction work, etc., is to make of this boy a machine which only requires the feeding to keep it pouring out with accurate precision its finished product. Such instruction would be criminal. The regular shop man is not supposed to be interested in why a thing is so, all he is requested to do is to get results quickly from a cut-and-dried pattern or dimensions given him by the foreman or from a rod. The knives are ground, sharpened, and set for him. The saws are set, filed, and brazed. He loses the educational value connected with his vocation, thereby retarding his advancement. Let me give you an example of such a man. In our evening school, the enrollment of which is very large, we have men from every walk of life seeking instruction. Men from the factories want to learn more about their vocation. They do not come into contact with the various machines used. I have a man in one of my classes that has operated a miter saw for twelve years. The problem came up of mitering a moulding. His method was to cut and try until the angle fitted together. He had no conception of how to bisect an angle, and when shown how, all he did the rest of the evening was to familiarize himself with bisecting different angles. He had learned one thing that was of value to himself and employers. He is beginning to find pleasure in his work. He is continually looking for the whys and wherefores of an operation. He is beginning to see things in a new light as never before, has more respect for his vocation, and is now seeking to be a master of, not a slave, to his work.

In most schools instruction is only given in machine processes. The up-keep of the machines can and should be done in the school shops, such as sharpening and setting saws, grinding and setting planer knives, brazing band saws, and many other things that come up from time to time. Much educational value is lost by sending this class of work to the outside shops. Let the boys do the oiling of the machines, take care of them as much as possible, assist in determining trouble, and help to remedy it. Correlation with the different departments in the school should be encouraged as much as possible. Make it a part of the boy's work; show him the value of such correlation and in most cases this work will meet with a unanimous response.

To eliminate accidents and hold them to a minimum, establish safety devices for every machine. Lest we forget the health of the boy, we should establish blower systems in every manual training school where machines are used. He will find plenty of dust to breathe even if such a system is installed. See that nothing is left undone. Don't put it off until to-morrow. Do it now. You will then have done your part. The Emergency Control system is an ideal system to install in every manual training school where machines are used. With such a system the instructor is doubly fortified

for the safety of the boy. These controls are placed at the most convenient places about the shop and requires only the pushing of a button to stop every machine almost instantly. The instructor must carry out a program of "safety first," such as, mats on the floor, removing coats in the shop, etc. The best "safety first" is a careful instructor, coupled with a thorough and accurate knowledge of machines, their uses and dangers, and danger in their use. No instructor should attempt to give instruction on a machine unless he himself is a master of that machine. I have in the last four years given approximately fifty thousand lessons, excluding parochial and night schools, and not a single accident has occurred that required the attention of a physician. This is due to my insistence that the boys have a thorough and accurate knowledge of the machines and until they possess this knowledge they are under strict supervision. In spite of all my precautions good luck probably has played an important part.

The machines used at the South High School (you will pardon me for mentioning this school again) consist of:

One Rough Rip Saw.
One Swing Cut-Off Saw.
One Universal Saw.
One Jig Saw.
One Band Saw.
One 26″ Surface Planer.
One 5″ Pony Jointer.
One 12″ Buzz Planer.
Two Emery Grinders.
One Universal Grinder for sharpening planer knives, etc.
Eighteen Wood Turning Lathes, seven of which are installed.

All of these machines make an ideal equipment.

A boring and mortising machine would add greatly to the scope of work for advanced classes, also for special work for the Board of Education and especially for evening schools where men come from factories to learn machine processes.

It is serious to see how much work is spoiled by the hand process of boring holes "out of true," not because they were improperly laid out but from the fact that the auger bits usually follow the course of least resistance —the soft grain of the wood. I am yet to be convinced that a series of holes can be bored true by the brace and bit process without a jig or machine adapted for such work.

In conclusion, of what advantage is all this training to the boy? It arouses in him a respect for labor. It teaches him to give 100% of labor for every dollar earned, to appreciate what constitutes a day's work, to know the value of a dollar earned by his own hands, and to be a keen observer in determining the quality of workmanship. It also encourages initiative, accuracy, self-control, and independence.

THE BUILDING OF SCHOOL FURNITURE BY THE MANUAL TRAINING DEPARTMENT.

SUPERINTENDENT E. C. WARRINER, SAGINAW, MICHIGAN.

When manual training was introduced into the elementary school, about twenty years ago, its course of study was extremely formal. Much time was spent on making joints, samples of stitches, cooking in minute portions, etc. The first impulse toward manual training in this country came from the Russian exhibit at the Centennial Exposition at Philadelphia in 1876. Inspired by what was shown here, the leaders of educational thought recommended the introduction of hand training in our schools as a correlative to mental training. As is always the case with educational innovations, this new movement began above and has worked downward. The secondary schools here and there, the Manual Training School of Washington University at St. Louis, the Chicago Manual Training School, the Manual Training High School of Louisville, Ky., the Toledo Manual Training High School were among the first to offer courses in wood and iron and in all these courses, the major part of the time was spent on formal models. The half-lap joint, the dove-tail joint, the mortise and tenon, etc., were made for sake of the exercises *per se* and the resulting models were good for nothing at the end but to be scrapped. In elementary wood-work, the Russian system so-called predominated and set designs, circles, ellipses, triangles, maltese crosses, etc., were cut or sawed out of thin wood. Following this line of thought, when sewing was introduced, canvass was first employed upon which the different stitches were illustrated, hypothetical patches were inserted on diminutive pieces of cloth or fictitious darns were mended in tiny bits of balbriggan. I remember well the spirit of the Eastern Drawing and Manual Training Teachers' Association which met at Cleveland in the spring of 1900. The speakers strenuously avoided any suggestion of the practical in their advocacy of the claims of manual training. The purely educational advantages of the new subject were made the basis of the argument. The papers were plainly addressed to superintendents and executive officers who from tradition were supposed to have no sympathy with the utilitarian in education. Formal discipline was still in the saddle. As Dr. C. K. Adams, once president of the University of Wisconsin, tersely put it, "For the building up of intellectual bone and muscle, there is no better way than to give a boy three full meals a day, consisting of the most part, of Greek, Latin and Mathematics. The teachers of manual training felt as late as 1900 that manual training could not hope for a place in the school curriculum unless it could qualify to a degree at least as a mind training, so-called, study, comparable with Greek, Latin or Mathematics. Therefore as a "sop to Cerberus," the educational benefits of hand training were dwelt upon. Twenty years ago, the speaker who even hinted that trade education

might be considered a legitimate function of the public school system was a traitor to the time-honored system and had no standing in the educational court.

Now what a change do we behold. Formal discipline seems to have been scientifically disproved. Far from having no utilitarian value as was formerly the criterion, a manual training model cannot pass muster today unless it can be put to some specific and definite use in the life of its maker. The necktie holder, the keyrack, the brush-broom holder, the bookrack, the coat hanger, the tabourette are familiar examples of models which conform to present-day standards. While there are still traces of the old influence, and while some teachers still spend too much time on formal exercises, both in wood and iron work, the tendency is even in girls' classes to learn the stitches by actual practise in hemming towels, in making aprons, in darning stockings, etc. In domestic science, cooking in large quantities is being attempted wherever possible and in a number of instances the high school cooking department has taken over the management of the school lunch counter. Indeed at Gary we are told the school buildings are painted and kept in repair by the high school manual training classes. All this follows the lead of Professor Dewey's dictum that "school is life," not merely a preparation for life. I suppose all will practically agree today that it is well to reproduce as nearly as possible actual life situations within the schoolroom. There is however a vast danger that we shall conceive these life situations in a too narrow spirit. In this ultra-materialistic age, we are forgetting that man does not live by bread alone. We have come close to the limit in making our school courses serve the present age and I forsee within the next decade if not immediately a settling down to a middle course where every great movement ultimately rests. These suggestions are offered as a mild protest against over differentiation and specialization with young children, against an over-emphasis in courses of study on things material, on objects which can be handled and seen, to the neglect of the vision splendid which is spiritual, invisible and eternal. I do not mean to hint that furniture should not be made in manual training classes and that meaningless formal exercises should be substituted. This would be a backward step which will never be taken.

But a real danger exists in the extreme commercialization of our courses of study. The principles which should govern in the selection of manual training exercises are as follows:

1. At least fifty per cent. of the work done should be for the school.

2. The rest of the work may be chosen at the pupil's option.

3. Every piece of work should be usable and it should be workmanlike and practical in all its details.

The first principle may need some enunciation and defense as it is contrary to the prevailing practice in a large degree. For the most part, pupils

are allowed to choose what they are to make in manual training classes, because this insures their interest and provides a strong effective motive. But there are reasons as follows why a part of the class time should be given to the school. First, this insures the turning out of a product which is to be measured by the commercial test. If a wood-working class is making work benches or bookcases or school aquariums, they must be usable and capable of being compared with similar products turned out of planing mills and woodwork factories. When a boy is working for himself defects and crudities of workmanship may be overlooked because no eyes but his may see his work, but with a bookcase which is to be a permanent asset of the school library the situation will be different, as his work will be constantly under the inspection of the public. A finer pride will motivate such a piece of work than that of private ownership. We were making a supply of fly-swatters last week in one of our classes and when I criticized the workmanship of the boys, I was told that they were only for the pupils and therefore the appearance did not matter. As a matter of fact the swatters were given away to representative club ladies of the city, whereupon the instructor apologized, saying had he known that this was their destination he would have been more particular. This is a good illustration of the point I am making, that work done for the school plant will be better done than private models.

Again it is good policy for manual training classes to devote a portion of their time to community work. Boards of Education have been induced to equip shops at large expense in response to the plea for the practical in education. Therefore manual training classes are expected to be able to turn their attention to anything required, from making work-benches to repairing broken chairs and screening gymnasium windows. Expectations are sometimes too great. One inexperienced with boys fails to realize the rawness of the material which the instructor has to deal with and may ask more than can reasonably be granted. But it has always seemed proper to me to put up to manual training classes all the work the classes can do. This is, as I have already shown, work which must stand the test of use and so tends to elevate the class standard. It also saves the Board of Education and the community more or less real money and therefore creates a favorable impression with the educational authorities.

Unless some such arrangement as I have mentioned does exist, trouble is to be experienced in inducing instructors to undertake these community projects. The instructor has his course of models laid out, according to a formal, logical, educational (so-called) plan, or in accordance with the wishes of the students themselves. Like every departmental teacher, the manual training instructor is most jealous of the time of his class and of its work. Nothing should be allowed to interfere with the course of study. Every superintendent is familiar with the lugubrious countenance of the manual training teacher who is asked to have the class lay aside its planned work to hem towels or make a bookcase for the library. I appreciate how

the teacher feels but cannot sympathize with his attitude, because I realize how poor policy it is from every point of view.

A part of the pupil's time, say 50 or 40%, should be given him to work according to his wishes, to make pieces of furniture for the home, etc. This ties up the home, the ultimate consumer, to the school, without whose co-operation, all our efforts will be nil. But to allow the pupil to assume the mental attitude that he has no obligation to the school and that the course of study is entirely optional is *laisser faire* run wild. Many classes in manual training have learned to soldier, to loaf on the jub, because they were asked to work for others. Our courses of study have been too free and easy of late years in all branches. Here is the hardest part of the curriculum to make rigid, but I am sure that an understanding with the school authorities such as I have suggested will give a virility to manual training courses to be had in no other way. If boys are allowed to choose from the beginning all the models they are to make, the opinion is bound to prevail among them that the class time and effort belong to them exclusively and that they are conferring a favor on the school and the board of tducation if they condescend (that is the proper word) to do anything for anyone else. Boys want to drop the course if they can not do just as they please in the class, when the class is conducted on the extreme elective plan. We shall never go back to the old hard and fast curriculum of a generation ago but we are bound to have more rigidity somewhere than we have had during the past fifteen years for the sake of character development, if for nothing else. Manual training courses should consist of 50% school work or 50% required models and 50% option work. In this way the eternal *must* will be held up before the pupil, a word which today is in danger of falling into "innocuous desuetude." The teacher will then be at liberty to use the class time for the making of any furniture or other school work which the class is able to do. Included in the term furniture in this paper is everything which can be used in the school whether it be made in the wood room, the forge shop, the foundry, the machine shop or the print shop. The market value of school work done in our manual training classes during the past four years has been as follows:

1911-12	$353.50
1912-13	407.59
1913-14	830.95
1914-15	876.47

Thinking that you may be interested in what the nature of this work is I have copied here a list of the jobs turned out in our different shops during the past year:

FORGE SHOP.

Boiler Room	$ 1.95
Garage	3.95
High School gymnasium	9.00
Garden tools repaired	6.00
Foundry	2.15
Forge Shop: Repairing and refitting 20 forges with new bolts, washers and bottom plates	32.50
Other forge shop work	3.20
Odd jobs	6.07
	$ 64.82

FOUNDRY.

300	Cylinders (straight)	$ 22.50
65	Taper Cylinders	5.85
225	Mandrels	20.25
200	Blank gears	12.00
25	Sets vise castings	12.00
20	Forge plates	16.20
3	Sets Giant strides	4.14
225	Shaper exercises	18.54
	Minor castings	4.87
		$ 116.35

PATTERN WORK.

Engine patterns	$ 30.00
Connecting rod patterns	5.00
Blank gear patterns	15.00
Straight cylinder patterns	9.00
Taper cylinder patterns	6.00
Mandrel patterns	8.00
Vise patterns	6.00
Giant stride patterns	5.00
Miscellaneous	1.75
	$ 85.85

WOODWORK.

Lockers, foundry wash room	$ 12.00
24 sets jumping standards	12.00
200 bird houses	50.00
40 pairs dumb bells	10.00
100 file and tool handles	5.00
25 mallets	5.00
8 boxes	5.00
Imposing Stone table	7.00
24 Tee squares	4.00
Miscellaneous	3.50
	$ 113.50

MACHINE SHOP.

14 Vises	$ 12.55
Gears and repairs for lathes	27.75
Giant stride for Longfellow school	10.00
Miscellaneous	32.80
	$ 83.10

TRADE SCHOOL.

Maple floor in Room 108	$ 80.00
Wiring in Rooms 104 and 108	13.00
90 camp stools	22.50
18 Dressing room stools	9.00
52 Penmanship racks	7.80
Bird Houses	45.00
Miscellaneous	21.65
	$ 198.95

SHOP PHYSICS CLASS.

Excavation for garage	$ 4.00
Concrete foundation for garage	20.00
Fitting and glazing windows	5.00
6 Ironing board stands	15.00
	$ 44.00

AUTO CLASS.

Superstructure of garage	$ 100.00
Miscellaneous	12.00
	$ 112.00

PRINTING CLASS.

23 jobs with 13,750 impressions	$ 58.00
Grand total of work done for the school by manual training classes	$ 876.47

I do not contend that this is at all a remarkable showing but it is creditable, I believe, and must help to impress the board of education and the community with the value of a manual training department. As I have already shown, this kind of work is also best for the training and development of the boy and I therefore claim that I have proved my case, that half the pupil's time may be devoted to school projects.

BUILDING OF SCHOOL FURNITURE BY THE MANUAL TRAINING DEPARTMENT.

MR. WILLIAM H. CLARK, DETROIT.

Before taking up the discussion of the topic which is the title of this paper, I want to say something about the school where I observed this work, the Rochester Shop School, situated in what is now Exposition Park in Rochester, N. Y. Before it was Exposition Park it was the site of the old State Industrial School, a reformatory for both boys and girls. The old institution comprised some half dozen or more large brick and stone buildings standing on a tract of land of perhaps 40 acres in extent and surrounded by a high stone wall cut at several places for heavy iron gates. It was practically and in appearance a prison which was in time crowded out by the growth of the city and now occupies a very large tract of land some 20 or 30 miles from Rochester. The old tract has been made into a city park and the old buildings have been given over to various uses which a city can easily find for such buildings.

The Rochester Shop School occupies one of them and uses another for a lunch-room and for athletic purposes.

This bit of history I am giving because it had at the time of the establishment of the school in its present uarters and for a considerable time afterward, if indeed it has yet outlived it, a strong and direct influence unfavorable to the thriving of the young school. The old associations represented in the minds of Rochester people one of the heavy handicaps the school had to carry. They often refused to send their boys to the school for that reason only when there were other and very good reasons why they should have sent them there.

In consequence the attendance fell off at one time to an extent alarming to those interested in the work the school was manned and equipped to do. Mr. Bird, the present principal, took the helm at the lowest ebb of its fortunes and it has grown slowly but steadily under his management to its present stature and fitness of condition.

It has survived several different policies since it began some nine years ago in one of the old grade buildings of the city, but is now essentially a trade school, tho it still offers what they call there the "Tryout Course" for boys who expect to stay four years. In this "Tryout Course" they are given five months in each of four departments and make their own selection of the shop they wish to spend the remainder of their time in.

The length of the course may be either two years or four years. The *two-year course* is termed "practical" and the four year course "technical." Boys are admitted who have eighth grade qualifications.

The School contains five shop departments besides a fairly well equipped physical laboratory and four class rooms in charge of as many teachers of

academic subjects. There is the Print Shop, the Electrical Shop, the boys of which do considerable work in the different school buildings of the city; the Pattern Shop, Machine Shop and Cabinet Shop. The school once contained a very fairly conducted plumbing shop which, owing to the cramped quarters, has been moved to the new Washington Junior High School.

It is of the work of the Cabinet Shop I have been asked to write.

This shop is in charge of Mr. Fred Raab, one of the very few men I have met in whom were combined a high grade teaching ability with a practical and intimate knowledge of commercial manufacturing borne of years of experience in the factories of his home city, Rochester.

The working conditions in Mr. Raab's shop are as nearly those of a furniture factory as is practical under the differing circumstances.

Considering on the one hand that factory workers are usually adults who receive pay for their work and whose presence in the factory is due solely to the urgent and ever present need of this pay, while on the other hand the workers in the school shop are immature, irresponsible boys who receive no pay and are there often only because they must go to school somewhere. I say considering these differences, the quality of the product, the quantity of it, the rarity of an accident among dangerous machines and the general shop efficiency of these boys is a strong argument in favor of the establishment and maintenance of this type of school.

Formerly the boys worked eight hours per day and one group of boys remained in the shop all day doing no class work on their shop days. The school day has been shortened to 6¾ hours and divided into three periods of 2¼ hours each and no class stays longer than one period in the shop at a time. School opens at 8 o'clock, classes change at 10:15. Lunch is served in the school lunch room in a separate building in the park at 12:30. Classes meet again at 1:15 and school is out for the day at 3:30.

It may be well here for me to give you a list of the equipment of the cabinet shop. One swing saw for cutting stock to rough lengths, one band saw, one jointer, one 36″ planer, two table saws (not the universal type), one horizontal boring machine, one belt sander, one shaper, one universal sander, one drum sander, one 3-section veneer press. There is also a large steam coil used in glueing up and a large steam heated glue boiler.

This machinery is all in one large room, finishing and trimming being done in an adjoining room. The department began as a hand wood-working department and these machines have been added gradually.

The furniture built in this shop, with the exception of an occasional special job, consists of book cases, teachers' flat top desks, manual training benches, library and office tables, drawing boards, filing cabinets, science tables, chairs, extension dining tables, buffets, serving tables, and music cabinets. This work bears comparison with the best commercial product of its class and has some points of superiority over it. Mr. Bird writes me that the gross value of the product of the department for the calendar year

1915, based on the commercial price of the goods, amounted to $2,714.87. For the months of January and February this year the product amounted to $769.32. He adds that this work has been done with but one instructor.

This work is carried on in the following manner in what I will call the group or lot method as opposed to the individual method. For instance when there is a demand for flat top desks as indicated by orders on the cabinet shop from the Board office, stock is gotten out for a group or lot of perhaps eight or ten such desks by actual count and the stock is piled up in the shop to be carried away when required by the boys who are engaged at the time in putting it together.

The classes are divided into gangs or groups, one gang performing a certain operation such as grooving a certain panel in the desk until all these panels in the whole lot have gone through this operation. Or if these particular boys are called away before the job is done it is taken up where they leave it by a group from the next class coming into the shop. And so while no one boy carries to completion any particular piece of work he is so shifted from one job to another that before his time is out he has tried his hand at every part of the work done in the department.

One regular shift is made this way. One half the class work at the machines all one week performing the machine operations as the work comes to them there, while the other half is set at work where the glueing up, cleaning, sanding, finishing and trimming is done. The following week the halves change places.

The value of the work is increased and the impressions on the boy's mind made more lasting by the opportunity for repetition in this work. He doesn't do a thing once and then forget the lesson it was intended to give before he does it or sees it done again. He performs the same operation a great number of times and then is set at another, meanwhile seeing the whole project moving forward to completion and having brought forcibly home to himself the purpose of all this activity and the importance his own part has in relation to the whole undertaking. It is in a sense team work and each boy's mental and physical activity is in a measure stimulated by the desire to keep his end up.

New boys, "green hands" when they come into the shop, are usually set to work assisting the more experienced boys with the work in hand. This maneuver when used by as skillful an instructor as Mr. Raab, often has the effect of drawing out the best efforts of both the novice and his more experienced classmate.

The new boy feels that he ought to be able to do what another boy can do and may regard with a mild sort of envy whatever skill or proficiency the other boy shows. The older boy will usually try to appear well before the new boy and will feel a desire, if the matter has been tactfully put up to him, to bear with credit the responsibility the instructor has placed in him.

While these cabinet shop classes are not usually large the instructor has his hands pretty full supervising this work in the midst of whirling belts and saws guarding against accidents to the young workers themselves and on the alert to prevent a careless bit of machine work which might ruin valuable furniture or shop equipment.

The boys were formerly allowed a certain amount of time, about two hours each week, to work on their own projects. This practice has been discontinued however and no work is now done in the cabinet shop but work for the school system.

Several methods have been tried of teaching these shop boys drawing with a view to correlation with the work done in the shop. At one time the boys did their drawing under the instruction of a teacher who taught drawing only, but the way which has been so far found the most satisfactory and which is the system I believe now in use, is to have the shop teacher give his own boys instruction in drawing for his own shop work.

The boys begin with elementary problems in projection and the use of instruments and advance to where they execute complete working drawings of the products turned out of the shop. Dissembled parts of these pieces are in the drafting room where they can be readily examined and measured by the pupils under the eye of the instructor.

A full size working drawing of the work under way is laid down in the shop for the convenient reference of both instructor and pupil.

SYNOPSIS OF BUSINESS MEETING

March 31, 1916.

The meeting was called to order by Secretary-Treasurer L. P. Jocelyn, who explained the absence of President J. W. Mauck and of Miss Mary E. S. Gold, the former being in Honolulu and the latter in a hospital in Baltimore, Md. Mr. Wm. F. Head was appointed temporary Secretary.

Mr. Jocelyn, as acting chairman, appointed the various committees. He informed the meeting that he had appointed Miss Alice V. Guysi to act in Miss Gold's place and to preside at the General Session on Thursday morning, and had selected the first President of the Club, Mr. Lawrence Cameron Hull to act in President Mauck's place and to preside at the General Session on Friday morning.

The minutes of the last Annual Meeting were read by the Secretary and approved.

The Reports of the Secretary-Treasurer and Auditing Committee were read and accepted.

The report of the Nominating Committee was made by Superintendent W. G. Coburn of Battle Creek, adopted, and the officers therein named were declared elected.

Professor A. S. Whitney moved that the Michigan Schoolmasters' Club unite with the Michigan State Institute in holding a joint meeting on Thursday morning of the week of the Schoolmasters' Club. The motion was carried.

Superintendent E. C. Warriner of Saginaw moved that the next President of the Club appoint a committee to make a Scientific Study of High Schools along the line suggested by Professor Judd in his address to the Club, and that the sum of one hundred dollars be appropriated for that purpose. The motion prevailed.

After being called to the chair, and before introducing the speakers, Mr. Hull spoke with much feeling upon the formation and history of the Club of which he was the father and first President, and how the hand of fate, after a period of thirty years, had again placed him in the chair to preside at this, the greatest meeting in the history of the Club. Mr. Hull finished his splendid address by a scholarly résumé of the great educational work done by our universities, colleges and public schools.

Nominating Committee.

Chairman—Supt. W. G. Coburn, Battle Creek.
At Large—Miss Mary L. Miner, Detroit Central.
Supt. E. O. Marsh, Jackson.
Classical Conference—Prof. B. L. D'Ooge, State Normal College.

Modern Language Conference—Prof. W. F. Hauhart, University.
English Conference—Jessie Gregg, Kalamazoo.
History Conference—Prin. W. B. Sloan, Bay City.
Physics and Chemistry Conference—J. W. Matthews, Detroit Western.
Mathematical Conference—Prof. A. G. Hall, University.
Biological Conference—Miss Frances L. Stearns, Grand Rapids.
Commercial Conference—J. E. Chapman, Detroit Northwestern.
Physiography Conference—Miss Laura B. Ammerman, Lansing.
Art Conference—Mr. K. C. Margah, Highland Park.
Manual Training—Mr. C. A. Hach, Saginaw.
Educational Psychology—Supt. W. B. Arbaugh, Ypsilanti.
Home Economics—Supt. M. W. Longman, Owosso.

Auditing Committee.

Professor L. C. Plant, Michigan Agricultural College.
Professor A. G. Hall, University of Michigan.

Report of Nominating Committee.

President—C. O. Davis, University of Michigan.

Vice-President—Nancy S. Phelps, Detroit Cass Tech.

Secretary-Treasurer—Louis P. Jocelyn, Ann Arbor.

Classical—Chairman, F. W. Kelsey, University; Vice-Chairman, Miss Marion L. Jennings, Union High School, Grand Rapids; Secretary, Miss Clara J. Allison, Owosso.

Modern Language Conference—Chairman, J. R. Effinger, University; Secretary, Alice Rothman, Ann Arbor.

English Conference—Chairman, Frank G. Tompkins, Detroit Central; Secretary, Mary N. Eaton, South High School, Grand Rapids.

History Conference—Chairman, T. Paul Hickey, Western Normal; Secretary, May F. Conlon, Union High School, Grand Rapids.

Physics and Chemistry Conference—Chairman, B. E. Smith, Central High, Grand Rapids; Vice-Chairman, W. H. Clark, Central High, Detroit; Secretary, E. N. Worth, Central High, Kalamazoo.

Mathematics Conference—Chairman, J. A. Craig, Muskegon; Secretary, W. V. Garretson, University.

Biology Conference—Chairman, J. R. Locke, Highland Park; Secretary, Helen B. King, Saginaw.

Commercial Conference—Chairman, E. G. Potter, Highland Park; Vice-President, Dora Pitts, Detroit Western; Secretary, Anna M. Johnston, Detroit Eastern.

Physiography Conference — Chairman, Mark Jefferson, Normal College; Secretary, Charles Wilcox, Kalamazoo.

Art Conference—Chairman, Catherine C. Margah, Highland Park; Secretary, Beula Wadsworth, Kalamazoo.

Manual Training Conference—Chairman, E. G. Allen, Detroit Cass Tech.; Secretary, J. R. Jensen, South High School, Grand Rapids.

Educational Psychology Conference—Chairman, N. W. Cameron, Western Normal; Secretary, J. F. Thomas, Martindale Normal, Detroit.

Home Economics Conference—Chairman, Mary E. Edmunds, M. A. C.; Secretary, Martha H. French, Normal College.

FINANCIAL REPORT OF THE SECRETARY-TREASURER, 1915-1916.

Receipts

1915			
March	26	Balance as per last report, Commercial Department	$ 65.84
March	26	Balance as per last report, Savings Department	24.09
March	27	Deposit dues	72.10
April	1	" "	93.00
April	1	" "	215.00
April	3	" "	213.00
May	6	" "	9.00
May	20	" " and advertisements	21.00
June	4	" " and sale of Proceedings	74.00
June	16	" advertisements	10.00
June	17	" " and sale of Proceedings	12.00
Aug.	18	" " and sale of Proceedings	66.00
Oct.	1	" sale of Proceedings	70.00
Nov.	3	" sale of Proceedings	2.50
Nov.	5	" dues	1.00
Nov.	12	" advertisement	10.00
Nov.	27	" advertisement	22.10
Dec.	1	" Interest	1.45
1916			
Feb.	19	" sale of Proceedings	50.00
Total			$1032.08

Disbursements.

1915					
April	2	Check No.	320	Nellie Easton, clerk	$ 5.70
April	2	" "	321	M. E. McCarty, doorkeeper	1.20
April	2	" "	322	Henry Zuzzalo, address	59.10
April	2	" "	323	Lotus Coffman, address	40.00
April	3	" "	324	S. A. Moran, Letters	4.60
April	3	" "	325	L. P. Jocelyn, 6 mo. salary, Oct. 1—Apr. 1	100.00
April	5	" "	326	R. E. Spokes, doorkeeper	1.65
April	5	" "	327	Walter Klager, doorkeeper	.70
April	5	" "	328	Gertrude Doyle, clerk	4.35
April	5	" "	329	C. E. Ritter, doorkeeper	.50
April	5	" "	330	R. Gregory, doorkeeper	.70

April	5	"	"	331	F. J. Merkle, doorkeeper	1.25
April	5	"	"	332	Howard Park, doorkeeper	.70
April	5	"	"	333	A. W. Gallup, doorkeeper	1.00
April	5	"	"	334	E. E. Wagner, doorkeeper	2.20
April	5	"	"	335	O. G. Schlotterbeck, doorkeeper	1.74
April	5	"	"	336	F. L. Osborne, doorkeeper	3.20
April	5	"	"	337	Roger Thomas, doorkeeper	1.20
April	7	"	"	338	Stanley Hawkes, doorkeeper	1.20
April	7	"	"	339	Victor Legg, doorkeeper	1.50
April	7	"	"	340	H. Hulbert, doorkeeper	1.05
April	7	"	"	341	C. W. Blashill, doorkeeper	1.50
April	7	"	"	342	E. K. Chapin, doorkeeper	1.00
April	8	"	"	343	J. P. Luce, doorkeeper	.50
April	8	"	"	344	L. G. Berger, doorkeeper	.40
April	8	"	"	345	destroyed	.00
April	8	"	"	346	H. J. McNeil, doorkeeper	.60
April	10	"	"	347	Douglas Miller delivery	1.32
April	19	"	"	348	D. W. Johnson, address expense	42.50
April	19	"	"	349	Mark Jefferson, address expense	5.00
April	19	"	"	350	R. D. Salisbury, address expense	16.00
April	20	"	"	351	Davis & Ohlinger, printing	1.25
April	22	"	"	352	J. H. Trybon, stamps and printing	8.00
April	22	"	"	353	C. F. Meyers, Postal Cards and printing	5.50
May	3	"	"	354	American Express Co.	1.83
May	3	"	"	355	W. L. Perkins, Physiography Conference	2.12
May	6	"	"	356	H. J. Abbott, stamps	5.00
May	20	"	"	357	Marion L. Jennings, exhibit	1.95
June	1	"	"	358	S. W. Millard, Badges, Receipts, etc.	21.25
June	17	"	"	359	University of Michigan, fixing Hill Auditorium for Physiography Lectures	24.49
July	8	"	"	360	The Ann Arbor Press, Printing, on account	200.00
Sept.	24	"	"	361	Clerical work and office expenses for the year	42.00
Sept.	24	"	"	362	Haller Jewelry Co., stamps	2.00
Oct.	13	"	"	363	Haller Jewelry Co., 5c stamps for Proceedings	10.00
Oct.	14	"	"	364	Haller Jewelry Co., 5c stamps for Proceedings	10.00
Nov.	3	"	"	365	F. & M. Bank to transfer account	.00
Nov.	3	"	"	366	L. P. Jocelyn, 6 mos. salary to Oct. 1	100.00
Nov.	27	"	"	367	The Ann Arbor Press, Printing, in full	103.18
1916						
Feb.	4	"	"	368	H. J. Abbott, stamps	2.00
Feb.	22	"	"	369	Mack & Co., Postal Cards	1.00
March	15	"	"	370	H. J. Abbott, 1c stamps for Programs	25.00
March	15	"	"	371	H. J. Abbott, 1c stamps for Programs	10.00
March	25	Total disbursements				$ 878.93
		Amount in Savings Department				25.54
		Amount in Commercial Department				127.61
						$1032.08
		Cash Balance				$153 15

Report of Auditing Committee.

We, the undersigned, the Auditing Committee of the Michigan Schoolmasters' Club, have examined the accounts and vouchers of Mr. Louis P. Jocelyn, the Treasurer of the Club, for the year 1915-1916, and find the same to be correct and accurate.

L. V. Plant, M. A. C.
A. G. Hall, U. of M.

Meeting adjourned.

Louis P. Jocelyn, Secretary.

PROGRAM OF GENERAL SESSIONS

(Admission to all meetings of the Club by badge.)

UNIVERSITY LECTURES

Tuesday, March 28

4:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding Officer—Professor C. H. Van Tyne.

The First and the Second Fall of Constantinople,*
Professor Paul van den Ven, University of Louvain, Belgium.

Wednesday Afternoon, March 29

4:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding Officer—Professor F. W. Kelsey.

Mediæval Repositories of Learning,*
Dr. E. A. Loew, University of Oxford, England.

Wednesday Afternoon, March 29

5:30 o'clock

MICHIGAN UNION BUILDING

Informal Reception of Members of the Schoolmasters' Club and Speakers.

Chairman of Reception Committee—Professor W. W. Florer, University of Michigan.

Principals' Banquet at 6:00 o'clock.

HIGH SCHOOL PRINCIPALS' ASSOCIATION

Wednesday Evening, March 29

6:00 o'clock

MICHIGAN UNION

Chairman—Principal E. N. Worth, Kalamazoo.

Secretary—Principal L. S. Parmelee, Flint.

1. Dinner.**
2. Address: Professor C. H. Judd, University of Chicago.
3. Address: Professor G. D. Strayer, Columbia University.
4. Round Table.
5. Business Meeting.

* Illustrated with stereopticon.

**Open to all persons interested. Plates, at $1.00, may be reserved by writing Principal W. M. Aiken, Ann Arbor.

UNIVERSITY LECTURE

Wednesday Evening, March 29

8:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding officer—Professor Campbell Bonner, University.

Byzantine Monuments of Italy,*

Professor Paul van den Ven, University of Louvain. Belgium.

Thursday Morning, March 30

9:15 o'clock

AUDITORIUM OF NEW SCIENCE BUILDING

President—President J. W. Mauck. Hillsdale College.
Vice-President—Miss Mary E. S. Gold, Flint.
Secretary—Mr. L. P. Jocelyn, Ann Arbor.

1. (a) The Drawing Instinct in Primitive Man.
   Professor Mortimer E. Cooley, Dean of the Colleges of Engineering and Architecture, University.

   (b) The Value of a Sense of Beauty and of Ability to Express Ideas through Drawing,
   Five-minute addresses from unexpected sources.
2. Art in Harness,*
   Dr. James P. Haney, Director of Drawing in the High Schools of New York City.
3. The Purpose of Art Education in the High School. Illustrated with Demonstration Board,
   Professor Royal Bailey Farnum, Supervisor of Drawing and Industrial Training, State of New York.

NOTE:—Mr. Haney and Mr. Farnum will speak again at 2:00 o'clock at the Art Conference.

Thursday Afternoon, March 30

4:00 o'clock

BARBOUR GYMNASIUM

Young Ladies' Gymnastic Demonstrations and Games.

Thursday Afternoon, March 30

4:15 o'clock

ROOM B-8, HIGH SCHOOL

Michigan Interscholastic Athletic Association.

Chairman—Principal N. B. Sloan, Bay City.
Secretary—Mr. J. W. Matthews, Detroit Western.

1. General Discussion of Interscholastic Athletics.
2. Business Meeting.

* Illustrated with stereopticon.

Thursday Afternoon, March 30

4:00 o'clock

ROOM B-2, HIGH SCHOOL

Michigan State Federation of Teachers' Clubs
Chairman—Mrs. Lou I. Sigler, Grand Rapids.
Secretary—Miss Lizzie R. Hanchett, Grand Rapids.
General Business meeting of the Presidents.

UNIVERSITY LECTURE

Thursday Afternoon, March 30

4:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding Officer—Professor B. L. D'Ooge, State Normal College.

The Oldest Latin Manuscripts,*
Dr. E. A. Loew, University of Oxford, England.

Thursday Evening, March 30

8:00 o'clock

UNIVERSITY HALL

Latin Play

THE MENAECHMI OF PLAUTUS. Presented by the Classical Club of the University of Michigan, with musical settings composed by Professor Albert A. Stanley and rendered by members of the University School of Music.

In order to meet the expenses of the play it is necessary to make a charge for admission, but the number of seats will be limited in order that all who obtain tickets may be able to see and hear. With every admission ticket (price 50 cents) a libretto containing the Latin text with an English translation will be furnished without extra cost. A reserved seat and libretto will be furnished for 75 cents.

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* Illustrated with stereopticon.

Friday Morning, March 31

9:00 o'clock

AUDITORIUM OF NEW SCIENCE BUILDING

Business Meeting of General Session

President—President J. W. Mauck, Hillsdale College.
Vice-President—Miss Mary E. S. Gold, Flint.
Secretary—Mr. L. P. Jocelyn, Ann Arbor.

(a) Reports of Officers.
(b) Reports of Committees.
(c) General Business.

9:30 o'clock

Literary Meeting of General Session

1. The Status of School Superintendents, Principals, and Teachers in High Schools,
   Professor Allan S. Whitney, Head of Educational Department, University of Michigan.
2. How to Make Scientific Studies in Education Effective,
   Professor C. H. Judd, Head of School of Education, University of Chicago.

Friday Afternoon, March 31

4:15 o'clock

AUDITORIUM OF NEW SCIENCE BUILDING

(Under the Auspices of the Department of Geology and Geography of the University.)

Address: "The Barrier Boundaries of the Mediterranean in the Present War,"
Miss Ellen Churchill Semple, University of Chicago.

Friday Evening, March 31

8:00 o'clock

AUDITORIUM OF NEW SCIENCE BUILDING

(Under the Auspices of the Department of Geology and Geography of the University.)

Address: "Geographic Influences in Japan,"
Miss Ellen Churchill Semple, University of Chicago.

Saturday Afternoon, April 1

BARBOUR GYMNASIUM

12:00 o'clock

Alumnæ Luncheon and Junior Girls' Play.

(Tickets at $1.00 should be reserved by Friday, March 31. Apply to Dean Jordan.)

* Illustrated with stereopticon.

PROGRAM OF CONFERENCES

TWENTY-SECOND CLASSICAL CONFERENCE

(Admission by badge)

Chairman—Francis W. Kelsey, University of Michigan.
Vice-President—Miss Marion L. Jennings, Union High School, Grand Rapids.
Secretary—Miss Clara J. Allison, High School, Owosso.
Extension Committee—
Miss Clara J. Allison.
Dr. F. O. Bates, Central High School, Detroit.
Professor A. R. Crittenden, University of Michigan.

All Papers limited in length to 20 minutes.

Tuesday Afternoon, March 28

UNIVERSITY LECTURE

4:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding Officer—Professor C. H. Van Tyne.
The First and the Second Fall of Constantinople,*
Professor Paul van den Ven, University of Louvain.

Wednesday Afternoon, March 29

2:00 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

1. Martin Luther D'Ooge: An Appreciation,
Dean Walter Miller, University of Missouri.
Mr. Lawrence Cameron Hull, Detroit.
2. Grammar up to Date,
Miss Olive M. Sutherland, Northwestern, Detroit.
3. On Word-division in the Codex Oblongus of Lucretius, and the verse division of the Classic Poets as helps in the determination of the Phrasing of spoken Latin,
Dr. Gilbert H. Taylor, University of Michigan.
4. Discussion of Dr. Taylor's paper on Word-division and Phrasing of spoken Latin,
Dr. Susan H. Ballou, Western State Normal School.
5. Greek Numerals,
Professor L. C. Karpinski, University of Michigan.

UNIVERSITY LECTURE

4:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

6. Mediaeval Repositories of Learning,*
Dr. E. A. Loew, University of Oxford, England.

* Illustrated with stereopticon.

UNIVERSITY LECTURE

Wednesday Evening, March 29

8:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding Officer—Professor Campbell Bonner, U. of M.

7. Byzantine Monuments in Italy,*
   Professor Paul van den Ven, University of Louvain.

Thursday Afternoon, March 30

2:00 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding Officer—Professor B. L. D'Ooge, State Normal College.

8. The Relation of General Linguistics to the Teaching of Languages,
   Professor Clarence L. Meader, University of Michigan.
9. A New Opportunity: The Detroit Junior High School Course in Latin,
   Principal J. Remsen Bishop, Detroit Eastern.
10. The Costumes of Roman Comedy,*
    Dr. Orma F. Butler, University of Michigan.
11. Opportunities for Research in the Classical Field afforded by the Library of Congress,
    Professor William W. Bishop, University of Michigan.
12. By-ways in the Teaching of High School Latin,*
    Miss Lena M. Foote, La Grange High School, Indiana.
13. Business Meeting: Report of the Extension Committee, and Election of Officers.

UNIVERSITY LECTURE

4:15 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

14. The Oldest Latin Manuscripts,*
    Dr. E. A. Loew, University of Oxford, England.

Friday Afternoon, March 31

2:00 o'clock

UPPER LECTURE ROOM, ALUMNI MEMORIAL HALL

Presiding Officer—Professor John T. Ewing, Alma College.

15. Greek Ideas of an Afterworld,
    Professor O. O. Norris, State Normal College.
16. The Roman Sense of Humor,
    Miss Anna M. Barnard, Central State Normal School.
17. The Tactics of the Battle of Cannae compared with the Tactics of the Battle of Tannenberg, August 26-30, 1914.*
    Dr. George H. Allen, Berlin, Germany.

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* Illustrated with stereopticon.

18. The Lot Oracle at Delphi,*
Dr. F. E. Robbins, University of Michigan.
19. The Latin work of the Oak Park High School,*
Dr. Loura B. Woodruff, Oak Park High School, Chicago.

MODERN LANGUAGE CONFERENCE

(Admission by badge)

Chairman—Dean J. R. Effinger, University of Michigan.
Secretary—Miss Emilie A. Flinterman, Detroit Central.

Thursday Afternoon, March 30

2:00 o'clock

ROOM 203, UNIVERSITY HALL

Chairman—Professor A. G. Canfield, University of Michigan.

1. What the Teacher Gets Out of It,
Mrs. Lyda H. Johnson, Battle Creek High School.
2. Matthew Arnold and Heinrich Heine,
Mr. Herman J. Weigand, University of Michigan.
3. Devices for Maintaining Interest in the Study of a Foreign Language,
Miss Alice M. Cornwell, Sault Ste. Marie High School.
4. The German Shakespeare Society,
Professor W. F. Hauhart, University of Michigan.
5. Foreign Languages in a Six-Year High School Course,
Professor C. O. Davis, University of Michigan.

Friday Afternoon, March 31

2:00 o'clock

ROOM 203, UNIVERSITY HALL

Chairman—Professor Max Winkler, University of Michigan.

6. The Experience of an Exchange Teacher in Berlin,
Professor Ernst Fischer, Michigan Agricultural College.
7. Spanish in American Schools,
Mr. Rodrigo Bonilla, University of Michigan.
8. Scientific German in College and High School,
Professor J. W. Scholl, University of Michigan.
9. The Study of German in a Small High School,
Miss Alice Johnson, Principal, Howell High School.
10. The Association of Modern Foreign Language Teachers of the Central West and South." A statement of the plans of this new organization by its President,
Professor A. G. Canfield, University of Michigan.

* Illustrated with stereopticon.

ENGLISH CONFERENCE

(Admission by badge)

Friday Afternoon, March 31

HIGH SCHOOL AUDITORIUM

Chairman—Professor T. E. Rankin, University of Michigan.
Secretary—Miss Ida M. Schaible, Ann Arbor.

1. American Speech,
   Professor F. N. Scott, University of Michigan.
2. Biography through Oral Composition.
   Miss Mary Newell Eaton, Head of English Department South High School, Grand Rapids.
3. Business English,
   Assistant Professor W. D. Moriarty, University of Michigan.
4. Shakespeare's England,*
   Dr. H. S. Mallory, University of Michigan.

HISTORY CONFERENCE

Thursday Afternoon, March 30

2:00 o'clock

ROOM C-3, HIGH SCHOOL

Chairman—Professor T. P. Hickey, Western State Normal.
Secretary—Miss Mary Conlon, Grand Rapids.

1. A Discussion of the J. R. Sutton Paper, read at the American History Association, University of California, July 22, 1915,
   Principal N. B. Sloan, Bay City, Michigan.
2. Michigan History in Michigan Schools,
   Mrs. M. B. Ferry, Curator Michigan Historical Museum.
3. Elementary Economics,
   Professor Frank Carlton, Albion College.

Friday Afternoon, March 31

2:00 o'clock

ROOM C-3, HIGH SCHOOL

4. Concerning our Subject,
   Professor Earl Dow, University of Michigan.
5. That First Course in United States History,
   Miss Ruth Thompson, Battle Creek.
6. The Course in History for Small High Schools,
   Professor C. E. Pray, Ypsilanti Normal (Member State Committee on this Subject).
7. Discussion,
   Professor C. S. Larzelere, Mount Pleasant Normal.

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* Illustrated with stereopticon.

CONFERENCE OF PHYSICS AND CHEMISTRY

(Admission by badge)

Thursday Afternoon, March 30

1:30 o'clock

PHYSICAL LABORATORY, WEST LECTURE ROOM

Chairman—Professor F. R. Gorton, State Normal College.
Vice-President—Mr. Theodore E. Wagner, Detroit Western.
Secretary—Mr. F. C. Irwin, Detroit Central.

1. (a) The position of the Image in a Plane Mirror,
   (b) Center of Gravity,
   Mr. B. S. Smith, Grand Rapids Central.
2. A second semester course in Chemistry for boys.
   Mr. W. H. Clark, Detroit Central.
3. A Demonstration Microphone-controlled Tuning Fork,
   Mr. N. J. Drouyer, Yale.
4. Chemistry for Girls,
   Mr. J. S. Brown, Detroit Central.
5. The Use of Direct Reading Instruments for Determining Power in Direct Current Circuits,
   Mr. George Maxwell, Detroit Cass Technical.
6. New High School Laboratories,
   Mr. D. F. Ross, Ypsilanti.
7. Davis' Falling Body Apparatus,
   Mr. F. M. Langworthy, Albion.
8. Laboratory Stock Room Accounting,
   Mr. A. R. De Pue, Monroe.
9. Business Meeting.

Friday Afternoon, March 31

2:00 o'clock

PHYSICAL LABORATORY, WEST LECTURE ROOM

10. Demonstration of Electric Osmosis,
    Mr. Alvin Strickler, State Normal College.
11. Use of the Automatic Scale in Chemistry,
    Mr. B. J. Rivett, Detroit Northwestern.
12. Experiments in Soil Physics for High Schools,
    Mr. M. A. Cobb, Central Normal School.
13. Uniformity in Physical Experiments for High Schools,
    Mr. R. V. Allman, Detroit Central.
14. A Home-made Calorimeter,
    Mr. H. A. Davis, Port Huron.
15. Physics for Girls,
    Mr. H. E. Hammond, Kalamazoo H. S.
16. Trigonometric Function Indicator,
    Mr. S. C. Mitchell, East Tawas.

MATHEMATICAL CONFERENCE

(Admission by badge)

Thursday Afternoon, March 30

12:30 o'clock

Luncheon at Newberry Hall Tea Room. 50c a plate.

Half-a-dozen five-minute talks.

Chairman—Professor L. C. Karpinski, University.
Secretary—Mr. Edward F. Gee, Central High School, Detroit.

3:00 o'clock

AUDITORIUM OF NEW SCIENCE BUILDING

The Story of Algebra,*
Professor L. C. Karpinski, University of Michigan.

Friday Afternoon, March 31

2:00 o'clock

TAPPAN HALL

1. Higher Mathematics as Related to Elementary Mathematics.
   (a) Projective Geometry, Prof. J. W. Bradshaw, U. of M.
   (b) Mechanics, Prof. Peter Field, U. of M.
   (c) Calculus, Prof. T. R. Running, U. of M.
   (d) Analytic Geometry, Dr. L. A. Hopkins, U. of M.
2. Practical Phases of High School Mathematics.
   (a) Shop Problems, Mr. Lewis Hayes, Detroit Cass Tech.
   (b) Farm Problems, Professor L. C. Emmons, M. A. C.
   (c) High School Mathematics from the Parent's Point of View, Prin. J. F. Thomas, Detroit Martindale Normal.
   (d) General High School Mathematics, Prin. I. B. Gilbert, Grand Rapids Union High; Prin. R. D. Barbour, Cadillac; Miss Sadie Alley, Detroit Northwestern; Mr. W. N. Isbell, Detroit Central.
   (e) History of Mathematics in Elementary Mathematics, Miss M. L. Welton, Union High, Grand Rapids.
   (f) A Trigonometrical Device, Supt. S. C. Mitchell, East Tawas.

BIOLOGICAL CONFERENCE

(Admission by badge)

Thursday Afternoon, March 30

2:00 o'clock

NEW SCIENCE BUILDING

Chairman—James R. Locke, Highland Park. Room F, 214.
Secretary—Miss Helen B. King, Saginaw.

1. Report on Elementary Science Situation,
   Dr. LeRoy H. Harvey, Western State Normal School.

* Illustrated with stereopticon.

2. Discussion of Report,
   (a) Professor E. D. Huntington, Detroit.
   (b) Mr. Edward Whitney, Northwestern High School.
   (c) Superintendent F. W. Frostie, St. Charles.
3. How the Introduction of Junior College Work has Affected our Courses in Zoology and Botany,
   Miss Ethel B. Chase, Central High School, Detroit.
4. Open Forum.

Friday Afternoon, March 31

2:00 o'clock

NEW SCIENCE BUILDING

5. Symposium on the Mechanism of Heredity:
   (a) Crossing Over,
   Professor W. E. Praeger, Kalamazoo College.
   (b) Irregular Mitoses in Oenothera,
   Professor H. H. Bartlett, University of Michigan.
   (c) Chromosomes in Relation to Sex,
   Professor R. W. Hegner, University of Michigan.
   (d) Cytoplasm and Heredity,
   Professor A. Franklin Shull, University of Michigan.
6. Open Forum.

A luncheon to all biologists and their friends will be served on Thursday, March 30, at 12 o'clock, in Room B-100, Natural Science Building. Those who expect to attend are requested to notify Dr. J. H. Ehlers, 1216 South University Ave., Ann Arbor, in advance, in order that arrangements may be made for the proper number of persons.

COMMERCIAL CONFERENCE

(Admission by badge)

Thursday Afternoon, March 30

2:00 o'clock

ROOM B-8, HIGH SCHOOL

Chairman—Mr. L. H. Rich, Bay City.
Secretary—Mr. O. V. Adams, Ann Arbor.

1. Advanced Dictation Practice,
   Mrs. Wainright, Cleary Business College, Ypsilanti.
2. The Teaching of English in a Commercial Course,
   Mr. C. H. Hagar, Chicago, Ill.
3. Commercial Geography—Its Place in Commercial Education,
   (Speaker to be selected.)
4. Looking Forward,
   Ivan E. Chapman, Head Commercial Department, Northwestern High School, Detroit.
5. General Discussion.
6. Election of Officers.

PHYSIOGRAPHY CONFERENCE

(Admission by badge)

Friday Afternoon, March 31

1:30 o'clock

ROOM 217-G, NEW SCIENCE BUILDING

Chairman—Miss Helen M. Martin, Battle Creek.

Secretary—Superintendent F. W. Frostic, St. Charles.

1. (a) Report on the N. E. A. Conference on School Science,
   (b) Report on the Joint Meeting with the Biology Section
   Superintendent F. W. Frostic, St. Charles.
2. The Recent Eruption of Mt. Lassen, California,*
   Professor Wm. H. Hobbs, University of Michigan.
3. Should Physiography be Taught in the High Schools?
   Miss Berenice L. Haug, Central High School, Detroit.
   Discussion led by Dr. Delos Fall, Albion College.
4. Some Experiences in Teaching General Science and Physiography,
   Mr. Harry A. Richardson, Kalamazoo.
5. Humanized Geography,
   Dr. Carl O. Sauer, University of Michigan.
6. The Strategical Geography of the United States,*
   Professor Wm. H. Hobbs, University of Michigan.
7. Through the courtesy of the Department of Geology and Geography of the University the Conference is invited to attend a lecture by Miss Ellen Churchill Semple, on "The Barrier Boundaries of the Mediterranean in the Present War." The Conference will adjourn at 4:15 to the auditorium of the New Science Building to hear this lecture, and another one at 8 p. m., on "Geographic Influences in Japan."

ART CONFERENCE

(Admission by badge)

Thursday Afternoon, March 30

2:00 o'clock

ROOM A, MEMORIAL HALL

Chairman—Mr. Harry Kurtzworth, Hackley Manual Training School, Muskegon.

Secretary—Miss Charlotte W. Calkins, Director Art Education, Grand Rapids.

Chairman of Program Committee—Miss Alice Viola Guysi, Director of Drawing, Detroit.

1. Art Teaching in High Schools,*
   Dr. James P. Haney, Director of Drawing in the High Schools of New York City.

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* Illustrated with stereopticon.

2. Free-Hand Drawing and Design,*
Professor Royal Bailey Farnum, Supervisor of Drawing and Industrial Training, State of New York.

MANUAL TRAINING CONFERENCE

(Admission by badge)

Friday Afternoon, March 31

2:00 o'clock

ROOM C-1, HIGH SCHOOL

Chairman—Principal Paul C. Stetson, South High, Grand Rapids.

Secretary—Mr. E. G. Allen, Detroit Cass Technical.

1. The Use of Power Machinery in Grades and High School,
   (a) Theoretical,
   W. A. Greeson, Supt. of Schools, Grand Rapids.
   (b) Practical,
   J. R. Jensen, Head Woodworking Dept., South High School, Grand Rapids.
2. Building of School Furniture by the Manual Training Dept.,
   (a) E. C. Warriner, Supt. of Schools, Saginaw.
   (b) Wm. H. Clark, Dept. of Manual Training, Detroit.
3. "Are we Side-Tracking the Needs of the Students to Meet the Demands of the Manufacturers?
   (a) E. G. Allen, Director Mechanical Dept., Detroit Cass Technical High School.
   (b) L. R. Abbott, Director Manual Training, Grand Rapids.
   The papers will be fifteen minutes in length, and an opportunity will be given for discussion from the floor.

EDUCATIONAL PSYCHOLOGY CONFERENCE

(Admission by badge)

Thursday Afternoon, March 30

2:00 o'clock

PHYSICS LECTURE ROOM, HIGH SCHOOL

Chairman—Professor N. A. Harvey, State Normal College.

Secretary—Professor H. C. Lott, State Normal College.

1. The Use of the Thorndyke Scale in Measuring Handwriting,
   Professor N. A. Harvey, State Normal College.
2. Discussion of No. 1,
   Superintendent W. B. Arbaugh, Ypsilanti.
3. Correlation of Results from three different Methods of Measuring English Composition.
   Professor Norman W. Cameron, Western Normal School.
4. General Discussion.

CONFERENCE OF HOME ECONOMICS

(Admission by badge)

Thursday Afternoon, March 30

2:00 o'clock

ROOM B-I, HIGH SCHOOL

Chairman—Miss Mary E. Edmunds, M. A. C.
Secretary—Miss Martha H. French, State Normal College.

1. The place of Home Economics in an Educational System,
   (a) University and College,
   (b) Normal School,
   (c) City School,
   (d) Rural School,
   Discussions to be lead by
      Miss Mary E. Edmonds, M. A. C.,
      Miss Georgia Laura White, M. A. C.,
      Mrs. Martha French, State Normal College,
      Miss Julia Grant, Detroit.
2. Ways and means of making Home Economics work of practical value through lunches in the city and rural schools, model apartments and hours, etc.
   Round Table Discussion.

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Univ. of Michigan.

Dennison, Walter
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Lee, L. B.
OWOSSO
Allison, Clara J.
Longman, M. W.
OXFORD, OHIO
Bishop, Elizabeth L.
PONTIAC
Dudley, S. M.
Jenner, G. L.
McCarroll, Sarah
Travis, Ora
PORT HURON
Crane, Mrs. S. A.
Davis, H. A.
Lewis, W. F.
RIVER ROUGE
McDonald, A.
SAGINAW
Baker, M. B.
King, Helen B.
Tanis, J. E.
Warner, W. W.
Warriner, E. C.
ST. CHARLES
Frostic, F. W.
ST. JOHNS
Buck, F. P.
Daboll, Winifred C.
SUPERIOR, WIS.
Wade, C. G.
SWARTHMORE, PA.
Dennison, Walter
TOLEDO, OHIO
Kimball, Edith M.
TUSTIN
Gould, Wm. E.
UNIVERSITY
Beman, W. W.
Berry, C. S.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Butler, Orma F.
Canfield, A. G.
Crittenden, A. R.
Cross, A. L.
Diekhoff, Tobias
Dow, E. W.
Edmonson, J. B.
Field, Peter
Finney, B. A.
Ford, W. B.
Gates, Erie L.
Glover, J. W.
Hall, A. G.
Hauhart, Wm. F.
Hildner, J. A. C.
Hutchins, H. B.
Jordan, Myra B.
Karpinski, L. C.
Kelsey, F. W.
Kraus, E. H.
Leverett, Frank
Lichty, D. M.
Lindsay, G. A.
Markley, J. L.
Meader, C. L.
Nelson, J. R.
Newcombe, F. C.
Pollock, J. B.
Rich, D. L.
Running, T. R.
Scott, F. N.
Pratt, Belle
Scott, I. D.
Sleator, Wm. W.
Swain, Geo. R.
Tilley, M. P.
Trueblood, T. C.
Wenley, R. M.
Whitney, A. S.
Williams, N. H.
Winkler, Max
Winter, J. G.
Ziwet, Alexander
WAYNE
Raycraft, R. E.
WESTERN NORMAL
Burnham, Ernest
Cameron, N. W.
Everett, J. P.
Harvey, L. H.
Hickey, T. P.
Waldo, D. B.
Wood, L. H.
WYANDOTTE
Smith, R. H.
YPSILANTI
Arbaugh, W. B.
Hardy, Carrie A.
Ross, DeForest
Steere, Edith A.

List of Members for 1916

ADRIAN
Boland, Genevieve
Hypes, A. J.
Lawrence, H. L.
Reed, E. J.
ALBION
Langworthy, F. M.
Swigart, R. G.
ALBION COLLEGE
Barr, C. E.
Fall, Delos
Goodrich, F. S.
Greene, C. W.

ALMA
Bittner, Eleanor
Crooks, H. M.
Ewing, T. T.
Luchtman, A. C.
Notestein, F. N.

ALPENA
Ford, R. D.
ANN ARBOR
Adams, O. V.
Aikin, W. M.
Bennett, Ella M.
Breed, Gertrude T.
Brown, Jessie
Chute, H. N.
Cornwell, Matie P.
Downs, Mrs. Lulu
Essery, E. E.
Essery, Florence

George, Louise
Glasier, Lucy
Goodell, F. Maude
Granville, Robt.
Groefsema, Mrs. E. H.
Hamilton, F. G.
Hamilton, Mrs. F. G.
Head, W. F.
Heathcote, Hazel B.
High, J. B.
Hutson, Agnes
Jocelyn, L. P.
Magdalene, Sister M.
O'Brien, Sarah
Palmer, Mrs. J. V.
Porter, Alice
Purtell, Catherine
Rennie, Florence M.
Robison, Cora
Robson, Louise
Rose, Mabel
Rosenthal, Henrietta
Rothman, Alice
Schaible, Ida M.
Slauson, H. M.
Springer, D. W.
Sturgis, Martha
Taylor, Alice
Tinkham, Lona C.
Weinmann, Louise
Wines, L. D.
Woessner, Anna L.
Wright, Wm. R.

BANCROFT
Rankin, P. T.

BATTLE CREEK
Allwardt, H. K.
Atkinson, H. R.
Atkinson, Mrs. H. R.
Benson, Walfred
Coburn, W. G.
Cooley, G. D.
Johnson, Lyda H.
Krell, Carrie
MacKenzie, Flora I.
Mann, Jessie
Marburger, W. G.
Martin, Helen M.
Swift, Gail H.

BANCROFT
Rankin, P. T.

BAY CITY
Basler, C. D.
Beese, Julia H.
Bishop, Lola L.
Butterfield, G. E.
Caldwell, Adah
Crawford, W. E.
Culp, V.
German, W. L.
Liskow, Julia
McKinney, Mary
Morris, W. W.
Peake, Ora B.
Perkins, W. L.
Schroeder, Matilda
Sharpe, E. M.
Sloan, N. B.
Taylor, Harriet L.
Ten Eyck, H. E.
Wells, Berta A.

BELDING
Langston, J. A.
Nielson, N. C.

BENZONIA
Norwalk, O. F.

CADILLAC
Barbour, R. D.

CAPAC
Gibb, H. L.

CEDAR SPRINGS
Clarke, Murnah
Luidens, J. E.

CENTRAL NORMAL
Barnard, Anna M.
Grawn, C. T.
Larzelere, C. S.

CHELSEA
Walling, W. L.

CHICAGO, ILL.
Denoyer, L. P.
Hagar, H. A.
Miner, R. Scott

CLEARY'S BUS. COL.
Cleary, P. R.
Trinkans, Bertha
Wainwright, Mrs. K.

CLIO
White, W. D.

COLDWATER
Bechtel, G. A.

CORUNNA
Johnson, C. R.

DEARBORN
Salisbury, H. A.

DETROIT
Andre, Ruba
Arbury, F. W.
Benedicta, Sister M.
Beverley, Clara
Boyer, C. J.
Bright, Alma A.
Celesta, Sister M.
Clarke, W. H.
Cody, Frank
Conover, Grace
Courtis, S. A.
Diederick, Florence
Eagleson, Stuart
Frederick, O. G.
Grant, Julia
Guysi, Alice V.
Guysi, Jeannette
Halstead, Jane
Honore, Paul
Hull, L. C.
Krug, Marguerite C.
Lightbody, W. M.
Loeffler, John
McBee, A. L.
McFadden, Irene
Marion, Sister M.
Merrill, J. W.
Morse, J. A.
Paul, J. L.
Pendry, May
Ripley, Alice
Roehm, Dorothy
Ruhlman, Marie
Shaw, E. R.
Simmons, Orville
Smith, A. T.
Trybon, J. H.
Vokes, Edna
Willard, G. W.

DETROIT CASS TEC.
Allen, E. G.
Ball, C. J.
Bryant, L. N.
Carr, Henrietta
Carr, J. M.
Chaney, L. K.
Clark, Frazer
Clendening, Frances
Comfort, B. F.
Cooke, C. S.
Daly, Chas.
Drake, E. B.
Early, Richard
Edmunds, Ina E.
Finly, A. W.
Fitch, Jeanette E.
Glass, W. N.
Gregg, Nellie
Hayes, E. L.
Hinman, H. W.
Holland, Cora E.
Holmes, D. L.
Holtsclaw, J. L.
Howell, J. C.
Jenney, H. R.
Jones, Geo. W.
Keal, H. M.
Kepler, F. R.
Kibby, C. G.
Labadie, S. N.
Lake, J. G.
McDougal, W. A.
Maxwell, G. W.
Melaas, Alva J.
Moore, J. C.
Noyes, A. H.
Phelps, Nancy S.

Phillips, Nellie G.
Randall, Ruth
Robinson, F. S.
Ryan, J. P.
Schell, H. G.
Skeels, A. D.
Smith, O. S.
Sullivan, Margaret C.
Walsh, May
Wiggin, Clara

DETROIT CENTRAL
Anderson, Flora L.
Andre, Elonia
Bammel, Grace
Bartlett, A. E.
Bates, F. O.
Bishop, Mrs. H. A.
Bishop, Helen L.
Bowerman, C. B.
Brown, J. S.
Burgess, L. G.
Camp, Mary F.
Campbell, Caroline E.
Chapman, H. H.
Chase, Ethel W. B.
Clark, W. H.
Collins, John A.
Conover, Kate B.
Cook, Frances C.
Copeland, Cornelia A.
Darnell, Albertus
Dillon, Florence G.
Frost, H. H.
Gee, E. F.
Goldman, Miriam D.
Hadley, May
Hanke, F. E.
Hardy, J. R.
Harrah, Grace E.
Haug, Bernice L.
Hawley, Elizabeth W.
Hill, Grace A.
Hine, Katherine G.
Hull, Isabella H.
Irland, Helen
Irwin, F. C.
Isbell, W. N.
Lang, Henrietta D.
Lowry, Florella R.
Mackenzie, David
Malcomson, Rachel A.
Mann, L. B.
Millard, Grace G.
Miner, Mary L.
Mutschel, Matilda
Paine, Lillian W.
Palmer, Hattie M.
Parker, Caroline
Plee, Nellie O.
Power, Mary F.
Schwartz, Elise M.
Spence, Chas.
Stocking, W. R. Jr.
Thompson, E. C.
Thompson, Margaret
Tompkins, F. G.
Watt, Isabella R.
Wattles, Helen
Wheateley, M. A.

DETROIT EASTERN
Bishop, J. R.
Browne, E. Mae
Coyle, Harriette
Currie, Alice L.
Dietz, Ada K.
Duffy, Irene A.
Frazier, J. W.
Fuhry, E. G.
Harvey, Caroline C.
Johnston, Anna M.
Kaye, Elizabeth
Klein, Adele
Kremer, Anna M.
Linn, Flora R.
Lusby, Lulu V.
McAdam, Grace P.
Mahoney, Anna G.
Marsh, Alice L.
Merriam, A. R.
O'Dea, Harriet
Pettee, Edith E.
Putnam, R. R.
Schmidt, E. H.
Sooy, F. W.
Struble, R. H.
Tuomey, Mabel
Vernor, Edna L.

DETROIT LIGGETT SCHOOL
Liggett, Miss J. M.
Rose, Margaret M.

DET. McMILLAN
Bow, W. E.
De Voe, Una
Fricke, Fred
Hall, C. F.
Hudson, Maud E.
King, Blanche L.
Murdock, G. W.
Trusdale, Ella K.

DETROIT MARTINDALE NORMAL
Conover, L. Lenore
Fleming, Jennie M.
Gillmore, Gertrude A.
Thomas, J. F.

DETROIT NORTHEASTERN
Alward, Hazel
Babcock, Gertrude M.
Cooper, L. G.
Elliott, Lucy
Foster, Frances A.
Fyan, Lila
Gardner, L. B.
Graham, A. A.
Koepfgen, L. A.
Leck, Bertha
Novak, Chas. M.
Pinnock, Joseph
Strelinger, Gladys M.

DETROIT NORTHWESTERN
Alley, Sadie M.
Bechtel, G. G.
Black, Isabelle M.
Brennan, J. V.
Carey, Eleanor J.
Chadwick, Marion T.
Chapman, Ivan E.
Corns, J. H.
Doolittle, W. C.
Emmons, Deda L.
Evans, Monica
Feige, Edna M.
Fox, Vera E.
Fraser, H. F.
Haigh, Margaret
Jones, A. F.
Long, Mabel
McMillan, Grace
Miller, E. L.
Moiles, Edith
Nicolson, Marjorie
Orth, Louise
Palmerlee, E. Grace
Porter, J. E.
Rivett, B. J.
Sutherland, Olive M.
Wagner, T. E.
Wentworth, Wm. H.
Whitney, Ada L.
Whitney, Edward
Wilson, Jean W.

DETROIT WESTERN
Arms, Nellie A.
Ball, Florence
Bancroft, Nellie E.
Barney, Bertha C.
Barney, Blanche K.
Bolles, B. G.
Bray, Corinne
Brown, Loretta
Brown, Margaret C.
Coughlan, Nina
Drake, Lucy
Edmonds, Geo. P.
Farnsworth, Mary F.
Farrell, Mary T.
Frutig, Marie L.
Hawn, Effie
Hempsted, Johanna K.
Hendershott, Pearl

Hickok, D. W.
Hirth, Ralph
Holmes, E. L.
Holmes, F. H.
Kerns, Martha
Ludke, C. W.
McMillan, D. W.
Matthews, J. W.
Meiser, Augusta B.
Morse, W. A.
Parker, Elizabeth
Parker, Flora E.
Pitts, Dora
Porter, E. H.
Roper, Gertrude
Seiffert, Berthold
Smalley, Harriet M.
Smith, Edna
Smith, Grace
Sundstrom, Elizabeth
Tennant, Nettie J.
Thomas, G. C.
Towar, Ethel L.
Waples, Marcia
Warner, W. E.
Weir, W. W.
Wilkinson, A. O.
Wiltsie, Katherine D.
Woodward, Mabel C.
Wuesthoff, Erna

DEXTER
Bowen, D. C.

EAST LANSING
Homes, Mary F.
Lewis, H. P.

EAST TAWAS
Mitchell, S. C.

FENTON
Brown, Opal
Bryce, Isabelle
Lyons, D. F.
Wood, Alger H.
Wood, Helen L.

FERRIS INSTITUTE
Ferris, W. N.

EDMORE
Pomfret, Mabel

FLINT
Cody, A. N.
Nutt, H. D.
Parmelee, L. S.
Puffer, W. J.
Russell, W. J.
Wightman, E. R.
Wright, L. L.

FLUSHING
Parker, W. E.

FORD CITY
Pike, C. F.

GRAND HAVEN
Clough, Susanna
Hopkins, Bertric M.
Hoyt, H. P.
Selden, A. W.
Wickard, Hortense

GRAND LEDGE
Smith, F. R.

GRAND RAPIDS
Bennett, J. G.
Broome, Amy L.
Calkins, Charlotte W.
Carpenter, C. M.
Christ, Helen C.
Conlon, May F.
Davis, Jesse B.
Dennis, Edith M.
Eaton, Mary N.
Greeson, W. A.
Hardon, Mary
Hinsdale, Mildred
Hulst, Cornelia S.
Jensen, J. R.
Jones, Anna S.
Kennedy, Keith
Krause, A. W.
Loomis, Marie L.
Shillinger, M. W.
Smith, B. E.
Stearns, Frances L.
Stetson, P. C.
Switzer, C. F.
Van de Velde, Alice
Welton, Mary L.
Wilcox, F. E.
Williams, Ethelberta

GRASS LAKE
Dorr, A. W.

HARBOR SPRINGS
Beadle, W. B.
Simenton, R. H.

HART
Harrington, H. L.

HASTINGS
Lederle, E. J.
Meier, Alexina
Thomas, Ann
Wallace, W. T.

HIGHLAND PARK
Altenburg, G. I.
Babcock, Lulu
Bacon, Josephine
Barr, Beatrice
Barton, Miriam
Belser, Leona M.
Berry, Euna
Card, Marjory
Carroll, Harriet
Dorsey, C. L.
Fletcher, Rachel
Galatian, Jane
Graves, Marie
Hall, W. C.
Hamilton, Mrs. Louise
Hardy, Mabel
Hull, Nina L.
Jackson, Emma
Knapp, T. J.
Kneip, Therese A.
Leonard, G. O.
Locke, Frances
Locke, J. R.
MacDonald, Isabel
Margah, Mrs. Katherine C.
Parsons, R. M.
Phillips, E. Ethel
Potter, E. G.
Prakken, Wm.
Richmond, Flora
Roger, Esca
Rosenthal, Rhoda
Russell, H. R.
Sherrod, Lowella R.
Sherzer, Josephine
Streator, Emma
Thomson, Evelyn E.
Van Loon, G. E.
Vardon, Anna
Ward, Lina J.
Whitney, Beulah G.
Yorks, Anna M.

HILLSDALE
Clancy, D. G.
Shepard, C. W.

HILLSDALE COL.
Larrabee, H. B.
Mauck, J. W.

HOLLAND
Haefliger, Eleanor

HOLLY
Green, R. R.

HOMER
House, Mabel

HOPE COLLEGE
Nykerk, J. B.

HOWELL
Fox, Karolena M.
Johnson, Alice
Knapp, Isabel
Roberts, Evelyn H.
Sharpe, E. Alma
Wells, Eunice

HUDSON
Miles, O. M.
Van Buskirk, D. A.

IDA
Carr, M. S.

IONIA
Forsythe, L. L.

IRON MOUNTAIN
Butler, L. A.

JACKSON
Bartoo, G. C.
Beck, Frances M.
Britten, Caroline

Josenhaus, R. J.
Kempf, Flora
Kirkendall, Geo.
Marsh, E. O.
Messinger, Fern
Otis, Florence I.
Parker, P. F.
Paschke, L. A.
Pearce, F. W.
Rieffanaugh, Nola
Schiller, G. B.
Shepard, Winifred
Skillen, Elizabeth
Trumble, O. S.
Watkins, E. E.
Wilcox, Elizabeth L.
JONESVILLE
Smith, Lucile
KALAMAZOO
Chamberlin, N. T.
Drake, E. H.
Hammond, H. E.
Hoebeke, C. J.
Howick, Harry
Richardson, H. A.
Sellers, F. M.
Starkweather, J. A.
Wadsworth, Beula
Worth, E. N.
KALAMAZOO COL.
Balch, Ernest A.
Praeger, W. E.
Williams, C. B.
Williams, G. A.
LAKE ODESSA
McEldowney, Dorothy
LANSING
Ammerman, Laura B.
Hall, E. M.
Keeler, F. L.
Pattengill, H. R.
Sexton, J. W.
Munson, J. M.
LAWRENCE
Woodward, Mabel
LINDEN
Burr, C. J.
LUDINGTON
Griffith, C. E.
MANCHESTER
Jacob, G.
Kirchhofer, Marie
Smith, G. A.
MARINE CITY
Hazelton, R.
MASON
Kennedy, J. E.
Symons, J. T.
MICH. AGRI. COL.
Bessey, Ernst A.
Chapman, C. W.
Edmunds, Mary
Emmons, L. C.
Fischer, E. G.
Friedmann, T. E.
Grover, E. L.
Plant, L. C.
Speeker, G. G.
White, Georgia L.
MIDLAND
Mott, J. B.
MONROE
Adams, Katherine
Cantrick, G. T.
De Pue, A. R.
Gallup, E. E.
Gilday, Selma
Highley, A. M.
Refuse, Eva
Theodosia, Sister M.
Van Camp, R. L.
MT. CLEMENS
Jacobi, Helen L.
MUNISING
Abell, E. L.
MUSKEGON
Craig, J. A.
Deubel, Ethel
Hartwell, S. O.
Hawkins, H. C.
Wyman, Alice
NEGAUNEE
Miller, E. A.
NEWBERRY
Koepfgen, L. P.
NILES
Allen, Hilah L.
Jelsch, John
Mann, C. H.
NORMAL COLLEGE
Alpermann, Johanna
Buell, Bertha G.
Clark, Genevieve
Clark, Lida
D'Ooge, B. L.
Goddard, Mary A.
Goodison, Bertha
Gorton, F. R.
Harvey, N. A.
Hatton, Mary E.
Jones, L. H.
Laird, S. B.
Lathers, J. S.
Lott, H. C.
Lyman, E. A.
McKaye, F. B.
Manning, G. A.
Muir, Helen B.
Norris, O. O.
Norton, Ada A.
Peet, B. W.
Pray, Carl E.
Priddy, Bessie L.
Sherzer, W. H.
Smith, Bertram G.
Strafer, Elinor
Strong, E. A.
Wilber, H. Z.
NORTHERN NORMAL
Spooner, C. C.
OAK PARK
Lee, L. B.
OLIVET
Batchellor, Mrs. Anne
OTSEGO
Beebe, A. H.
Hulbert, H. W.
OWOSSO
Allison, Clara J.
Connor, Elizabeth M.
Longman, M. W.
OXFORD, OHIO
Bishop, Elizabeth L.
PAINESDALE
Jeffers, F. A.
PETOSKEY
Beebe, Nellie I.
PONTIAC
Allen, D. C.
Dudley, S. M.
Jenner, G. L.
McCarroll, Sarah
Travis, O.
PORT HURON
Brown, Frances
Crane, Mrs. S. A.
Davis, H. A.
Hogan, Lilian L.
Lewis, W. F.
RICHMOND
Ellsworth, B. B.
RIVER ROUGE
Densmore, Louise
Eastman, Jennie L.
Freeland, Elma
Frost, Frances
Grant, Lee
McDonald, A.
Outwater, Olive
ROYAL OAK
Crane, Edith
SAGINAW
Baker, M. B.
Barnard, Florence B.
Coney, Charlotte
Feige, Elsa J.
King, Helen B.
Tanis, J. E.
Warner, W. W.
Warriner, E. C.
ST. CHARLES
Frostic, F. W.

ST. CLAIR HEIGHTS
Glauz, Vivian
ST. JOHNS
Bird, E. J.
Bird, Prudence M.
Buck, F. P.
Daboll, Winifred C.
ST. JOSEPH
Gardner, Eldridge
Merrill, E. J.
SAULT STE. MARIE
Cornwell, Alice M.
Powels, J. J.
SHELBY
Sanford, James
SOUTH HAVEN
Allen, H. B.
Hook, T. E.
STANDISH
Osborne, M. E.
SUPERIOR, WIS.
Wade, C. G.
SWARTHMORE, PA.
Dennison, Walter
TOLEDO, OHIO
Kimball, Edith M.
Refior, Sophie
Ryan, May
TRAVERSE CITY
Brundage, P. S.
Lamphear, J. R.
TUSTIN
Gould, Wm. E.
UNION CITY
Bassett, Georgiana
Cripps, J. L.
De Barr, Metta
Tench, S. W.
Weltmann, Ruth J.
UNIVERSITY
Austin, H. D.
Beman, W. W.
Berry, C. S.
Bishop, Wm. W.
Bishop, Mrs. W. W.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Butler, Miss O. F.
Butts, W. H.
Canfield, A. G.
Cooley, M. E.
Crittenden, A. R.
Cross, A. L.
Cross, Herbert
Davis, C. O.
Diekhoff, Tobias
Dow, E. W.
Edmonson, J. B.
Ficken, R. O.
Field, Peter
Finney, B. A.
Florer, W. W.
Ford, W. B.
Gates, Erie L.
Glover, J. W.
Hager, F. L.
Hall, A. G.
Hauhart, W. F.
Henderson, W. D.
Hildner, J. A. C.
Hobbs, W. H.
Hunt, Alice
Hutchins, H. B.
Jackson, G. L.
Jordan, Myra B.
Karpinski, L. C.
Kelsey, F. W.
Kraus, E. H.
La Rue, G. R.
Lee, A. O.
Leverett, Frank
Levi, M.
Lichty, D. M.
Lindsay, Geo. A.
McLaughlin Wm. A.
Markley, J. L.
Meader, C. L.
Moriarty, W. D.
Nelson, J. R.
Newcombe, F. C.
Pollock, J. B.
Rich, D. L.
Robbins, F. E.
Running, T. R.
Sauer, C. O.
Scott, F. N.
Scott, I. D.
Shull, A. F.
Sleator, W. W.
Smith, A. W.
Swain, Geo. R.
Taylor, Gilbert
Thieme, H. P.
Tilley, M. P.
Trueblood, T. C.
Van Tyne, C. H.
Wagner, C. P.
Wahr, F. B.
Wenley, R. M.
Whitney, A. S.
Williams, N. H.
Winkler, Max
Winter, J. G.
Ziwet, Alexander
UTICA
Eddy, Lillian G.
WAYNE
Hykes, Frances
Raycraft, R. E.
WESTERN NORMAL
Ballou, Susan H.
Burnham, Ernest
Cameron, N. W.
Everett, J. P.
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JOURNAL

OF THE

Michigan Schoolmasters' Club

FIFTY-SECOND MEETING

Held in Ann Arbor, March 28, 29, 30, 1917

ANN ARBOR, MICHIGAN

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Michigan Schoolmasters' Club

PROCEEDINGS OF THE FIFTY-SECOND MEETING, HELD AT ANN ARBOR, MARCH 28-30, 1917.

EDITED BY THE SECRETARY.

GENERAL MEETING

The week of March 26-30 saw one of the greatest educational gatherings of its kind in the history of the State, when the following organizations held their respective meetings: Michigan Association of Superintendents and School Boards, Educational Institute, Michigan Principals' Association, Classical Institute—Conference, Academy of Science, Michigan Federation of Teachers Clubs, Interscholastic Athletic Association, and the Michigan Schoolmasters' Club. It is unnecessary to say that the club had the largest and best meeting in its long history.

The General Sessions of the Club were held on Thursday and Friday mornings in University Hall. On Thursday morning was held a joint session of the Educational Institute and the Schoolmasters' Club when Dr. Leonard P. Ayres of the Russell Sage Foundation of New York spoke upon the subject, "Making Education Definite," and Professor Paul H. Hanus of Harvard University spoke upon the subject, "The Superintendent's Educational Policy."

On Friday morning Mr. F. C. Hendershott, Head of the Educational Department of the New York Edison Company, and Secretary of the National Association of Corporation Schools, spoke upon "The Changing Conditions in Industry and in Education," and Mr. Franklin W. Johnson, Principal of Chicago University High School, upon "Provision for Individual Differences."

The University Lectures given by Professor Ralph U. D. Magoffin of Johns Hopkins University, and Professor George Sarton, of Wondelgem, Belgium, were also much enjoyed by the many members of the club who attended them.

Special mention should be made of the Greek Play, "Iphigenia among the Taurians," which drew a large audience not only from the members of

the club and the citizens of Ann Arbor but also from Detroit and other nearby cities and towns. The play was presented by the Classical Club of the University of Michigan, and proved a great success. An address of welcome was given by Professor Clarence L. Meader to a large body of Greeks who came from Detroit to see the play. The reply was given by one of their officials chosen for the occasion.

The Gymnastic Drill by University girls, under the supervision of Miss Evans and Miss Wood, was of the usual high standard set by those women, and was very well attended.

The two new features introduced into the program by our President, Professor C. O. Davis, proved so successful that the club will undoubtedly continue them as special features for a time at least. These were the symposium given on Thursday evening and the summarization of all the conference meetings given on Friday afternoon.

One year ago we chronicled the glad fact that in the absence of President Mauck, Mr. Lawrence Cameron Hull, of Detroit, the first President and founder of our club, was called upon to fill his old position and preside at the annual meeting. With much feeling he spoke of the pleasure the occasion afforded him, and of the great growth and success of the club which were far beyond the expectations of its founders.

We cannot express our feelings of sorrow in now chronicling the fact that our first President has occupied his old chair for the last time and that he may not be able to see his club go on, as it undoubtedly will, in ever increasing strength and usefulness.

The loss of James B. Angell, President Emeritus of the University of Michigan, closed the week of our annual meeting of 1916. This loss is so great to us that words are inadequate to express it; especially is this true to those of us who are graduates of our University. His loss can only be felt by us who will miss him more and more as the years roll by.

In adding the name of Professor Walter Dennison of Sworthmore College, to the list of those who have answered to the last roll call of our club, we have added the third name of three of the best and most loyal members the club has ever had; three of those model types of old New England gentlemen and scholars whom the world can ill afford to lose.

CLASSICAL CONFERENCE

The programs of the Classical Conference were planned with three objects in view: (1) a constructive study of problems of present moment to classical teachers, (2) the promotion of a better feeling of fellowship among them, and (3) a broader knowledge and an enlarged vision.

The first of these objects was the main intent of the round table on Tuesday afternoon. The chief question discussed was the teaching of Latin in the Junior high school and below the ninth grade. The leader, Professor B. L. D'Ooge, emphasized the following points: that the Junior high school is affording an opportunity for the accomplishment of that which has for years been the recognized aim of Latin study, namely, a more thorough and intelligent knowledge of English; that formal English grammar, the bugbear of the average immature student, becomes simple and readily comprehended when taught with and through the Latin in the seventh and eighth grades; that the longer period, two years instead of one, for the study of Latin forms and vocabulary, and that at a time when memory is at its best, makes the mastery of these a case of ready and almost unconscious assimilation. Miss Isherwood followed in the same vein and the general discussion served only to emphasize the importance of the principles laid down by the leader. The same line of thought was continued on Thursday afternoon in the paper of Miss Congdon on *High School Latin from a Practical Viewpoint.*

Every session was a factor in the promotion of a feeling of co-operation and good fellowship; especially so the classical luncheon Thursday noon, attended by about one hundred. Here classical teachers and others met and exchanged greetings and experiences, optimistic and otherwise.

Postquam exempta fames epulis mensaeque remotae, the status of the Classics was discussed directly and indirectly not only by President Hutchins of Michigan and Professor Lord of Oberlin, but also by President McNair of the College of Mines, President Mauck of Hillsdale College, President Kedzie of the Michigan Agricultural College, and Professor Magoffin of The Johns Hopkins University.

While space forbids not only a detailed account but even an enumeration of all the articles contributing to "a broader knowledge and enlarged vision," the two series of lectures designed particularly to that end are not to be passed without comment. The topic, *Sidelights on the Study of Virgil,* as the name suggests, brought into prominence various matters more or less directly connected with the study of Virgil, matters which, often passed in cursory fashion, are yet capable of adding greatest interest to this study. Through these lectures Professor Kelsey, with the aid of an unusual set of slides, gave to the constellations so frequently mentioned in Virgil and other

writers some of the same reality they possessed for the ancients; he made Misenum, and the shore along the Bay of Naples where Virgil was probably buried, and, beside the shore, the modern park in which the poet's memory is very fittingly commemorated, of more than passing interest; while the interiors of those wonderfully decorated Roman homes, in which Virgil must have spent many hours, threw new light upon many of his descriptive passages. Of still greater interest were the portraits of Virgil, and greatest of all the descriptions of Octavia, that ideal Roman matron whose character forms so pleasing a contrast to that of the dissolute Julias, and of her son Marcellus, so that we come back to Virgil's lines on the death of this young Roman with a new, and inexpressible sympathy.[1]

Of the contents of the four lectures by Professor Ralph Van Deman Magoffin on *Aspects of Roman Life* it is impossible to convey any adequate idea to those who did not hear them. A faint suggestion of their spirit only can be given in so brief an account as this, for into four short lectures was gathered all that was vital in Roman life, yet with the whole so skillfully organized that it was a living presence which Professor Magoffin set before his audience.

So vivid was the portrayal, that it was not as a mere figure of history, but as a very human being, we saw the Roman returning from distant journeyings through the vast realm of which Rome was mistress, and thrilling, as he beheld his own beloved and matchless city, with the joy that only a Roman could know. When he appeared before us in the solemn moments of life, it was with that same impression of reality, so that we would have withdrawn from very shame of intrusion. Again as he engaged in the arduous tasks of camp and military expedition, or in the more homely ones of daily life, we followed him with the interest we accord only to those whose work to us is an actuality; and set as we are in the midst of the wizardry of modern inventions, we yet marvelled at bridges and aqueducts, temples and arches, the works of his hands and brain, built to endure, perchance, beyond the day when our own shall have vanished. Indeed, so much of the present was this Roman, that it was with a feeling of foreboding we watched him amid scenes of luxury and ease, letting Roman ideals fade and disappear in that veil of fog and mist with which the self-indulgent of every age wraps himself about. For a brief time at least the centuries had been blotted out and we had been in the very presence of those immortal Romans who hand down to us in their history, the most wonderful the world has ever known, a legacy of example and warning.

Last but by no means least, either in point of interest aroused or in what it contributed to the "enlarged vision," was the Greek play, *Iphigenia*

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[1] The set of slides used with these lectures are being added to the sets in the Extension Department of the University and can be borrowed by any school. The lectures which they illustrate are to be put into print.

among the Taurians. The preliminary talks by Professor Bonner and Dr. Robbins aided much in an appreciative understanding of the play which will remain always "a thing of beauty" in the minds of those present.[2]

CLARA F. ALLISON, Secretary.

HIGH SCHOOL LATIN FROM A PRACTICAL VIEW POINT.

MISS NELLIE CONGDON, HILLSDALE, MICHIGAN.

In the hurry of this commercial age, many people are manifesting an impatience at the schools for not being more practical both in the subjects taught and the methods used. They would eliminate all subjects that do not contribute immediately to one's earning capacity. Then, if at the end of his high school course, a boy cannot competently take his place in the business world, they declare that the methods are wrong.

Of all the subjects attacked by those who demand a "practical" education, none are considered so useless as the Greek and Latin. Since Greek has almost entirely disappeared from the high schools, the full tide of criticism is directed against the Latin. Pity is expressed for the children who are made to endure the two, three, or four years of it, and made to forego the pleasure and profit other subjects would have brought. The school men are accused of being non-progressive, and of following only "the ancient formula for producing a scholar and a gentleman."

With these critics the practical subjects are only those that have a direct bearing on gaining a livelihood. But Nathaniel Butler of the University of Chicago said, "The production of a skilled workman is not the only practical end of education. Education that does not make an effective workman is defective, but equally so is education that does not produce an intelligent and effective citizen and neighbor, and again equally so the education that does not prepare one to make an appropriate use of his leisure." (Miss Sabin's book, "The Relation of Latin to Practical Life," p. 123.)

Since, however, the demand is for an education that will be of practical use to the workman, we must give our chief attention to the answer to this demand. Surely no one with ambition would be content to know but one line of work and that only superficially; and all must acknowledge that one becomes more skilled, more efficient, more in demand as his general intelligence is increased. Then that education is in the end the most practical "that increases the mental and intellectual efficiency of the boys and girls

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[2] Accounts of the Greek play are published in *The Nation* for April 19, 1917, *The Classical Weekly* for May 7, and, with illustrations, in *Art and Archaeology* for June and July, 1917.

regardless of the particular trade, or business, or profession they may enter." (Classical Journal, December, 1914.)

One of the greatest factors of success in any line of work is the ability to convey ideas and impressions clearly and convincingly through the medium of one's native tongue. The success of the ambitious mechanic, the stenographer, the clever advertiser, the lawyer, or the doctor can depend at a most critical time on his mastery of language. There are important letters, addresses, interpretations, the success or failure of which may depend entirely on the correctness, clearness, or convincing power of the English used. Some few people seem to possess this ability as a happy gift; more have to acquire it, cultivate it with painstaking effort.

The foundation of this power the secondary schools must give. But how? It would seem at first thought that definite, vigorous instruction in English ought to be easy to give and with most gratifying results. However, I believe it is the hardest and most unsatisfactory subject to teach, and, for many, to understand in the whole curriculum. Its fundamental principles are not easy for the boys and girls to understand. To how many older people are they simple and clear?

A clear comprehension of our English can come only through a comparative study of a foreign language. Many argue that for this purpose the modern languages, German, French, or Spanish serve, and have the added desirability of being "practical." They are however, too much like the English in idiom and points of grammar to throw light on constructions or give the training that comes through word study, translation, or involve any particular mental discipline. The language best adapted should be the one from which our own is derived, but still presents sufficient difference to demand careful comparison and close application in study of forms and constructions.

That one language we believe to be the Latin. It is said that two-thirds of the words found in the dictionary are Latin, and in our ordinary speech one-half. If our language is Latin to so large an extent, and if a correct use of English is so great a factor in one's success, what can be more practical than a study of English through its greatest source, the Latin?

In Dr. Lodge's list of words from the vocabularies of Caesar, Cicero and Virgil, 80% have English derivatives or cognates. A systematic study of these words through the entire high school course ought to work wonders for both the English and Latin. The association with the English aids in a more rapid and lasting mastery of the Latin vocabulary, which ought to make the use of "ponies" quite unnecessary and undesirable. On the other hand the English stands revealed in quite a new light and words take on a meaning that would forever remain hidden if not seen through the Latin.

Again, the constant study of the Latin sentence and paragraph with its logical and exact arrangement of clauses, tense sequence, and thought subordination through phases and clauses, can not fail to give the student increased power over his English as he reads or as he writes. It is the testi-

mony of more than one English teacher that the Latin students are the quickest to see the meaning of new words, the keenest to get the thought of the paragraph and to follow up the line of thought through the succession of paragraphs.

Even the commercial schools are recognizing the influence Latin has in making good English students. The experiment of Dorchester High School is doubtless familiar to all who read the Classical Journal. Their commercial department was large, and the members as usual were very weak in their English. Mistakes in spelling and inaccurate use of words prevented their obtaining or keeping really good positions. It was noticed that those who had previously studied Latin, made the best commercial students, and soon secured promotion after going to work. After due consideration, a two-year course was offered in 1913. The success has been so marked and the Latin students have been so superior to the others that the teachers of that school feel that they have proved the very practical advantage of this study.

Other high school subjects than English can well call on the Latin for assistance. The many long, strange words in botany, chemistry, and physics need not remain strange to those who have been trained in Latin derivatives. Long lists of these words and their Latin derivatives have appeared in the recent numbers of the Classical Journal, and it seems to me that the teachers of these subjects could very profitably make use of them.

Regarding the study of modern languages, we find it always true that the students who go to these with a previous training in Latin find them comparatively easy and become far superior to the students who have not had this help. The modern languages are so often held up as the practical ones, but so far as the high school or even college instruction goes, they are even more purely cultural than the Latin and do not give the practical help that the Latin does. Very few are able to speak German, French, or Spanish even haltingly, and find themselves quite at sea when trying to follow a conversation between natives to say nothing of their trying to participate in it. On the other hand, Latin living in our own, is in constant, daily, practical use.

Another valuable feature of the study of Latin is the mental discipline it affords. From the very beginning, the pupils have to compare forms, think carefully and consecutively. Several of my own pupils have spoken of the concentration it has demanded, and have felt it paid if only for that reason. Through it they have learned to concentrate.

A civil engineer of marked ability and success—Elmer Lawrence Corthell, Dr. Sc., says in the Outlook, June, 1914, that he owes all his success to the years devoted to the classics. During the civil war he was given places of responsiiblity for which he had had no trainng, but he learned to concentrate, and used that power to a quick mastery of military tactics. Years later when health failed and a change of work was necessary he left college and found an opportunity to do some work in civil engineering. Again he had had no training for the work at hand, but again he made use of that power

of concentration which enabled him to think through a situation to the end. Of the value of the classics, he says, "There is no *opinion* about this matter; it is a fact that has appeared plainly many times in my life. The training I received in the classics has enabled me to *do* things that I never could have done without it. It has given me *power* in my professional work during the last forty-seven years. More than that, it has carried me far afield in my engineering and given me world-wide interests along many lines of human activity."

In other places I have read statements from the heads of engineering departments asking that men come to them trained in the classics, for they are found to be the most ambitious, the keenest, and the least afraid of work, and at the same time possessed of broad intelligence.

As a preparation for the study of law, no line of work could serve better; not so much for the technical Latin phrases as for the discipline involved. Professor Nathan Abbott, who established the Stanford Law School, said, "Legal study and legal practice are largely a matter of verbal interpretation. Where can you get a finer training for this sort of thing than in Latin, where every sentence is a lesson in logic, and where you have constant exercise in unfolding the intricacies of syntactical puzzles?" (Classical Journal, Dec., 1914.)

But the training for work is not the whole aim of a practical education. Only about one-third of our time is given to active work, the remaining two-thirds have to do with social obligations and with the leisure hours. If we feel that those are best fitted to guide the affairs of State who have the best grasp of the progress of human events, no less necessary is it that we have an intelligent citizen body. Familiarity with the old Roman civilization as portrayed by Caesar, Cicero, and Virgil can go a long way toward furnishing a strong background for the civilization of today and the intervening centuries.

If the young people could be trained to find employment for their leisure hours within themselves, and not be so dependent on companionship and excitement, many of the present-day problems would be solved. To be sure, the home has a responsibility here, but the schools have no less.

President Meiklejohn of Amherst College, says, "When a man of the world is told that a boy is to be trained in thinking because of the joys and satisfaction of thinking itself, just in order that he may go on thinking as long as he lives, the man of the world has been heard to scoff and to ridicule the idle dreaming of scholarly men. But if thinking is not a good thing in itself, if intellectual activity is not worth while for its own sake, will the man of the world tell us what it is? There are those who are so closely shut up within a little round of petty pleasures that they have never dreamed of the fun of reading and conversing and investigating and reflecting. And of these one can only say that the difference is one of taste, and that their tastes seem to be relatively dull and stupid. Surely it is the function of the liberal

college to save boys from that stupidity, to give them an appetite for the pleasure of thinking, to make them sensitive to the joys of appreciation and understanding, to show them how sweet and captivating and wholesome are the games of the mind. At the time when the play element is still dominant, it is worth while to acquaint boys with the sport of facing and solving problems. Apart from some of the experiences of friendship and sympathy, I doubt if there are any human interests so permanently satisfying, so fine and splendid in themselves, as are those of intellectual activity. To give our boys that zest, that delight in things intellectual, to give them an appreciation of a life worth living, to make them men of intellectual culture—that certainly is one part of the work of any liberal college." (Amherst Graduate Quarterly, Nov., 1912, p. 61.)

ENGLISH CONFERENCE

THE PLACE OF THE PLAY IN HIGH SCHOOL.

MISS MAY HADLEY, CENTRAL HIGH SCHOOL, DETROIT.

The play has a place in high school. That place ought, however, to be carefully considered that we may determine whether it is a place in keeping with its value.

Not so many years ago the play in high school was thought of as a purely social event, a sort of merry making time that should close the school most pleasantly. Charity spread her mantle wide over these performances, and had need to. Doting parents and friends assembled and gazed in dazzled pride and wonder. There was little earnestness in conection with the event from any quarter. The performers were praised impartially, a whole month's allowance was often handed over the footlights in the form of long stemmed roses, the costumes were worn at the dance that followed, and the blunders were reviewed as quite the best part of it.

We have advanced from this. Now, a play is chosen under extreme nervous tension, for it must satisfy and give parts to a large number of students; much very serious effort is expended in the hope that the result may be something really worth while in drama. There is no lack of seriousness now. Students see in the school play of today more than mere amusement. Often, they eagerly recommend themselves for parts, stating, quite frankly, their qualifications, acquired or inherited.

After a few breathless weeks of over-coaching, these young actors appear in some well-selected play, that must not be bungled with the idea that blunders will be funny. No one asks or wants now a merely indulgent audience. We want the acting judged on its merits.

Often these performances are surprisingly good, and I believe are well worth doing, even considering two serious objections. But there are these two objections.

First: The cost in nerve force on the part of the over-tired teacher in charge, who has quite all she should do aside from it, and who crowds the play into her program in too much of a martyr spirit.

Second: The confused and superficial idea of drama the student acquires under this high-pressure, hot-house kind of treatment. Were it not that even under these trying conditions one sees possibility for the young student in the study of drama, it might seem unwise to make a plea for a real place in high school.

Two things have often been done for students even in the short time given to the preparing of a single play. Each is valuable to the individual.

One is curbing the vanity and over-confidence of certain students, deluded with the idea that they know what dramatic ability is and that they have it. No student should get away from us without our showing him his error. The other is the bringing forward of those students who are content to sit by and look on, and whose dramatic instinct is so much truer that they consider impersonation on the stage a fearsome undertaking. They hardly dare tread where the others rush in.

Now this may be done gently, quite painlessly I think, by getting our too talented students to see that any true expression in drama must result from quickened imagination, from a living in and feeling the character in question. Show such a student that what he boasted was external, and that art must grow from within out, that impression is greater than expression. Deepen impression and expression will take care of itself. Since all this does much more for him than merely to change his idea of what drama requires, it is pretty well worth while.

Sometimes this is accomplished by introducing into the cast the most obscure student at hand, if perchance you have noted any of promise. It is rather a wholesome experience for the conquering hero to stand a little aside and be shown what someone else may be able to do in a little time if he learn first to forget himself. The point is, I think, that the talented lad is so loth to forget himself, and the awkward one so glad to find that he can escape the personality that he has decided is dully commonplace. The student thus drawn into a situation new to him gains confidence. And I believe the sense of power, the satisfaction of having filled a place with unguessed fitness, the self respect, and the inspiration gained would be difficult to measure. Many a life is robbed of its barrenness, its mediocrity, in recalling an impulse of imagination that made him for a time quite other than himself. Work without imagination is drudgery. The study of drama may help boys and girls to be more than drudges, even successful drudges, with success spelled large and crossed maybe with perpendicular bars.

At high school age, young people are especially interested in adult men and women, their work and their ways; and it seems reasonable to conclude that this might be a favorable time for a little study of drama. For its function is to simplify life and character and present the slow result of years in an hour. Attention is concentrated. A proper curriculum of theater going might; and doubtless will, be made a part of the initiation of youth into the study of life and character. In his every-day life, human qualities of envy, greed, jealousy, self-sacrifice, patriotism are mingled with many others in the individual and do not stand out so clearly; but on the stage each quality is emphasized, set apart, and made to teach its lesson. We are moved to emulate or to avoid. In every-day affairs, often noble effort seems lost and evil triumphs; on the stage this never happens and we go home feeling that right prevails. All this should persuade us that the study and production of drama offer much to young students.

What may the high school do? Hasn't the high school the possibility of a real little theater in the community? We have something of an equipment. We may be sure of a faithful audience. Box office receipts are no problem. We have our actors all ready to be made. We have teachers all ready to furnish the enthusiasm, if they have the time to do it.

I must try to say something about the choice of a play to be studied. Plays innumerable, interesting too, are being constantly published. Many of the modern plays, however, are cynical, and therefore will not do at all. It is a false notion to restrict amateurs to material which the professional stage would not dream of accepting. Sentimental rubbish is not better than cynical smartness. Neither are crude farces, persecuted heroines, sneering villains, muscular heroes, and the like. We must choose something really worth while, written by a real playwright, to be actually performed by real actors. Plays of direct and strong appeal, whether serious or comic are best adapted to our purposes, plays with firmly drawn characters, directly expressed feeling, plenty of action, and solidly constructed situations.

Most amateur plays fail because the whole is so thin it becomes merely vapid and empty. One would rather try young people in the blustering of Katherine and Petruchio than in a scene between Sir Peter and Lady Teazle. Mrs. Malaprop can be readily mastered, while Rosalind in the hands of a school-girl makes one a bit uneasy.

Farce is fearfully hard to play well, great fun for the actors but those who witness it are apt to suffer sadly. I saw Anatole France's "The Man who Married a Dumb Wife" presented by high school students recently remarkably well, but that does not alter the fact that farce is about the hardest thing young players may attempt.

The clear-cut definite fun of Bob Acres, country bumpkin pranked in gay brocades and aping all the ways of the fop of the period is easy to do fairly well, as compared with "Lend Me Five Shillings." Nine students in ten could do well in Bottom, the Weaver," while only one high school student in ten could find or show the fun in the romantic poet who is so excessively pained by the inartistic, in Lord Dunsaney's "The Lost Silk Hat."

Homely, elemental situations, genuine, wholesome, suit our purpose admirably. Zona Gale's "Neighbors" is an example. There can be no exact limits in the choice, only general guides. J. M. Barrie's "Quality Street," one might think unsuited, but I was delighted with the work of high school students in it, in a small town in Illinois, and the teacher in charge told me that she had to choose her actors from a graduating class of twelve.

The play once selected and the parts assigned, there is opportunity to insist on team work. For one player's failure to do his share may ruin the whole. This is one of the best chances in the student's school life to teach him the value of co-operation and the fact of social obligation. No rehearsal can go on to any andantage if one be absent. Every actor depends absolutely on his fellows. Why isn't this interdependence learned in dramatic study as

well as in athletics? Loyalty too is tested pretty thoroughly. No person appears in any scene however minor his part, who does not have it in his power to wreck the whole. This trust is not betrayed. Some have grievances, real or imagined, but loyalty prevails.

These are some of the good things that may come of the play in high school. Much might be said about the interesting artistry of work in drama; aside from acting, work in scene-study, in costume, in properties, and the countless details that make the study absorbing. But the present paper has aimed merely to show that the place of play in high school is not to exploit student or teacher but to teach knowledge of art and of life.

SOCIAL IDEALS AS PREREQUISITES TO COURSES IN HIGH-SCHOOL ENGLISH.

C. C. CERTAIN, HEAD OF THE DEPARTMENT OF ENGLISH, CASS TECHNICAL HIGH SCHOOL, DETROIT.

Language is a social phenomenon; the conventionalities of speech originate in the experiences of daily social life, and are maintained as modes of expression only insofar as social instincts and social consciousness tend to preserve them. The very existence of speech conventions implies a highly organized social order. It is quite natural, therefore, that these conventions lose their significance in isolation from social activities and situations. Yet, curiously enough, English teachers drill students upon speech conventions without attempting to bring these conventions into appropriate relation to social experience. In consequence of this, it happens that to the average student the language of the English class-room becomes a social anomaly, to be talked about, drilled upon, and studied, but not to be assimilated as part of the vernacular. In meeting the ordinary exigencies of their daily social life, high-school students speak a language not unlike our American vernacular, which is spoken and understood in terms of social experience. In meeting the exigencies of the daily recitation in English, however, they use expressions depending upon the stereotyped processes of the schoolroom and not upon social reactions. It is well enough to drill students upon the grammar of their language; it is equally well to instruct them in the rhetoric of their speech; but neither drill in grammar, nor instruction in rhetoric will focus the students' minds upon social ideals. Experience of a social kind is needed for the fomation of social ideals. The fault with the customary recitation in English is that it does not permit the students to meet one another on a common level of social experience. Formal class recitations are necessary in the teaching of English, but equally necessary is a form of class organization that brings the students into relations suffi-

ciently complex to give a sense of the stress and strain of social experience and sufficiently formal to demand an effort in the direction of accurate, forceful and sincere expression.

To the young people of industrial America social experience implies the reality of facts and situations—a reality that is impossible to them in complete isolation from industrial life. It is not, however, through a study of the external aspects of industrial life that the teacher may solve the riddle of reality. There was a time when it was said with considerable meaning that life in the school was *artificial* and life in the outside world *real*. In the old days, the pedagog ended his search for reality, where there were the fewest symbols of human power—in the unknown world of nature. In these days, the search for reality cannot end in the natural world, for there symbolism is manifold. Human life has grown infinitely complex in its relation to nature. Man has achieved, not reality, but artificiality in extending his control over natural forces. The environment alike of school life and of secular life has become increasingly artificial. Reality of life, say our industrial philosophers, is not attained in man's dominion over natural forces, but in his dominion over human nature. Teachers like men of industry and of commerce, must re-discover human nature through the processes of social experience. Their search for reality in environments foreign to the school is futile. The task of the teacher in the schoolroom is not to seek reality in commercial and industrial environments, but in social experience as a revelation of human nature, and as a means of idealization in modern economic life. Formerly the way of making life in the school *real* was to teach through the eyes and the ears; the new way of making life in the school *real* must be through a training that comes from social experience, because children in life outside of school are learning through the eyes and ears to the point of weariness. With eye knowledge and ear knowledge, they are surfeited; for human experience they go begging.

All of us know that so far as social experience is concerned, in the broader sense, there can be none in the English class as long as the student is so situated that his habitual modes of expression, and his characteristic modes of response are checked by the processes of teaching. Yet through the customary school-room routine, the nature of the individual is curbed violently in its social functions. The individual with his instinctive impulses, his traditional conduct, and his mental habits, all social in implication, is the victim of the straight-jacketed procedure of a teaching process almost wholly individualistic in aim.

In drilling upon the principles of grammar and rhetoric, it is highly proper that the aim should be individualistic, but in organizing the class for social expression the aim should be humanistic and social. Certainly if it is possible for the engineer and the business man to discriminate between individual interests and social interests and to establish methods of work formulated with reference to individual aims and social aims, it should not be impossible for the teacher to be equally discriminating.

I had an interesting conversation recently, with the staff manager of the Executives' Club of the Detroit Board of Commerce. He told me of the field of the club wherein one business may learn from another. In the Executives' Club, every phase of business receives consideration with reference to the *human problems* involved. The Club has its philosophy of work and a scheme of organization that *permits the members to do their work according to their system of philosophy.* I have been thinking of the striking contrast between the Club and other educational institutions such as our schools. In the Executives' Club the managers of various industries are brought into such a relation that they may *pool* their experiences. The organization *fosters the habit of exchanging information, and stimulates a sense of honor in business ethics.* The unit of organization is the "functionalizing group which is homogeneous in its interests and occupations. The subjects studied are of interest to all attending the meetings of the group. The scheme makes possible a high degree of group consciousness based upon a "kindred feeling which promotes sociability and freedom of expression."

Such organizations as the Detroit Executives' Club are coming into existence, because in the industrial world today, powerful forces are being focused upon the big, human aspects of life; there is a decided trend in the direction of a broad, humanizing culture; and business men are finding it profitable to supply means of nurturing this culture. In the study and analysis of commercial problems, the business man seems to be getting at the social meaning of life. Into the organization, administration, and control of commercial enterprises of all kinds, there enter new human relations, causing in the very nature and constitution of things, an increasing interdependence and an interlocking of interests. Upon uderstanding, co-operation, and sympathy depends, therefore, the success of modern industry. Business men in striving to meet the demands of the times are thinking of a *social* not of a *mechanical* regeneration. In their endeavors they are changing the ideals not only of our industrial but also of our educational institutions. The organization of sociological departments in this business or that; the organization of industrial councils among commercial institutions, and the expenditure of vast sums of money in social betterment and in cultural uplift should be matters of more than passing interest to our teaching profession.

It is of vital importance that our teaching profession inquire into the nature of processes peculiar to commerce and industry. There is a profound meaning in the "stirring and moving" that is going on in our commercial and industrial institutions. Teachers must see more, however, than gigantic machines—must understand more than the intricacy of commercial organization, if they are to fathom the meaning of our industrial life. But teachers, it seems, are failing in vision and understanding as was Sir Rabindranath Tagore, the mystic poet of India, who on his recent visit to America saw nothing but the steam boilers in our civilization and understood nothing but the mechanical efficiency of our industrial systems. Tagore was

blinded with the radiance of his own philosophy; he could not see that, in the western world, a new era was dawning. He never suspected that out of our ruthless system of steam boilers could come spiritual as well as physical and mechanical efficiency. Yet Rabindranath Tagore, for all his emphasis upon our industrialism, failed to make his emphasis strong enough. The truth of the matter is that in industrial America, the engineer and the efficiency expert are the only true philosophers, for teachers, ministers, and artists little understand the meaning of the industrial world in which they live. Teachers in particular have weakened their spiritual faith, doing reverence to the unknown powers of machinery. They have watched the exterior of our revolving industries, and patterned moulds into which to cast the materials of their own art. They are teachers, notwithstanding; but with an outworn philosophy, and unfortunately in no imperative need of a better, having formulated a creed sufficiently mechanical to answer purposes.

Teachers are greatly handicapped, in that they do not understand the limitations of machinery and do not appreciate the inadequacy of mechanical processes. The stupendous achievements of modern engineering were not realized until the engineer learned to depend upon the human soul in the organization and control of natural forces. Engineers and business men in the past decade have learned many practical lessons in the evaluation of physical and spiritual forces. For example, the Ford Motor Company which was organized on the basis of purely physical efficiency failed to yield large profits on the millions invested until the plant was reorganized on the basis of spiritual efficiency. It is through an analysis of such experiences, that teachers can best understand the educational needs of social life.

Tagore to the contrary notwithstanding, I am prepared to assert that, with the invention of the steam engine, began the re-discovery of human nature. It is true that life has become increasingly artificial with the complication of steam boilers; but it is also true that in the mastery of machinery man has increased his power to discern spiritual truth. Engineers and business men have, therefore, learned to discern spiritual truth, not in a mystical way, but in a practical way, as is being demonstrated in their philosophy of work. In this philosophy, the cultivation and refinement of human nature are demanded no less than the perfection of system and the attainment of mechanical efficiency. The business man soon becomes bankrupt, who is not constantly re-discovering human nature through the mechanical agencies of commercial and industrial life—who does not learn anew each day, that the human soul controls the balance between profit and loss.

The commercially-minded man has learned many other lessons on the side of human nature. He has become keenly sensible of the fact that the machines of industrialism have made life both in and out of the office artificial and mechanical. In consequence, he thinks of the emancipation of the human spirit as he organizes his business.

The teaching profession, however, has failed to perceive the real ideals of industrialism as they are being established in the minds of the practical

business man. Educators with much ado have been bringing into the school the mechanical equipment of the commercial office and of the factory. They have reorganized school life in an endeavor to socialize curricula; but all has been done with little avail, because educators, unlike business men, have not yet discovered the need of social ideals and have not brought mechanical genius into the proper relation to spiritual truth. Educators like the Hindu poet, Tagore, seem little to suspect that in the industrial world there is taking place a struggle for a spiritual as well as a physical efficiency and that, beyond the artificiality of our industrial system, is the reality of social experience and the spirituality of ideals.

The business man has discovered the function of the social group as an agency in the teaching process, and he is utilizing the social group in this connection. Both the engineer and the business man have learned to evaluate physical and spiritual forces in terms of human nature. They have recognized the inadequacy of mechanical processes, when these are not properly related to social ideals. It was in the effort to effect the proper adjustment between mechanical processes and social ideals, that the engineer and the business man discovered the function of the social group in the teaching process, and began to humanize the industrial world.

To humanize education, we must somehow learn to teach from the group standpoint as well as from the individual standpoint. In the normal social group, the individual feels himself to be in relation to the group. There is such a thing as group consciousness, and under normal conditions the individual is part of this consciousness. In the group, there exists a common interest, a common morality, a common knowledge, a common feeling, and a common will; and the individual makes appropriate intellectual and ethical adjustments to these more or less conscious states of intellect, will, and emotion. To teach from the group standpoint, we must at times break down the traditional teacher-pupil situation and organize the class into a social group.

Differences between organizations are most sharply distinguished by the simplest units of their mechanism. Taking the individual as the unit of organization in the school, and the group as the unit in the industrial world, let us make an analysis on the basis of these units. In the school the individual is supreme, in the industrial world the group is supreme. The teaching process is a process of individual insolation; whereas industrial processes tend more and more towards a co-ordination of effort and a combination of individual interests. In the school the individual learns to regulate his conduct with reference to one person—the teacher; in the commercial world he must learn to regulate his conduct with reference to the co-operating group and with reference to the community in which he lives.

In the school, there is little group consciousness, as the aims and methods of the teaching process are almost exclusively individualistic. There is slight interaction of thought and feeling among the children. Activities that make for a transfusion of ideas and emotions are said to complicate the prob-

lem of discipline. It seems far simpler to maintain discipline when the only situations permitted to develop lead to no complicatoins except those with the teacher whose authority symbolizes (in the minds of the children) supreme dignity and power. Something might be said in favor of school-life situations that make for ethical control.

Drill, repetition, and discipline have their places in the school-room régime; but training for habits of adaptibility, adjustability, and flexibility has its place likewise. Habits of reorganizing experience, of making judgments, of acting under the constraint of ethical situations are vital; these are habits that are established by adapting one's conduct, one's behavior, one's tastes to the standards and requirements of the group in which he is living. These are habits that imply a building up of a personal and a social philosophy from the experiences of daily life. Habits of this kind may bridge the chasm between the school and industry. The reason that the complex situations of the commercial office fail to bring appropriate thoughts to the surface of the well trained minds of high-school graduates is that these graduates have no social ideals. English teachers fail to teach pupils to write letters satisfactorily for social and business purposes, because English teachers fail to give a training favorable to the formation of the social ideals necessary to letter writing.

The social ideal has been characterized as a type of condensed social experience. Some of the energy that teachers of English are expending upon a "transfer of specific abilities," should be expended in effecting in their classes such a scheme of organization as will be stimulating to the social nature of the children and lead to experiences that make for ideals. Ideals are the product of experience. Dr. Bagley says that the "Experiences that the individual acquires may carry with them ideals that may later serve to modify adjustments even more fundamentally and efficiently than knowledge itself."

Now, if social ideals are the product of social experience, why not organize our classes as may seem most opportune from the standpoint of the social group? There is much said nowadays of socializing school curricula. I submit that there is no socialization until the class organization permits a normal reaction on the part of the children to the materials of the course of study.

Before attempting to organize a class as a social group, it is necessary for the teacher to discriminate clearly between the individualistic aim and the social aim in education. The individualistic aim is peculiar in that it tends to bring the individual pupil into some pedagogical relation to the teacher; the social aim is peculiar in that it tends to bring the pupil into some conscious relation to the class as a social group. The typical situation is created from the individualistic standpoint, when the teacher questions a pupil; the typical situation is created from the social standpoint when the teacher throws the pupil upon his own resources in some organized relation to the class as a social group.

The implications of the social group are co-ordination of effort, an intensified state of consciousness, co-operation, inter-communication, and sympathy. The organization of the social group for class work must provide the machinery for effective leadership. It must make possible situations in which the pupils are drawn into the necessity of making themselves understood by the other members of the group, and of tempering their conduct and their acts to the will and sentiment of the group. The class organization must create the compelling force of public opinion. In securing the proper conditions for a group lesson, the teacher must establish in the minds of the class, a sense of common experience, a sympathetic attitude, a community of interests, and a tendency to react to the stimulus of class enterprises.

In order to teach through the medium of the social group, it is necessary for the teacher of English to understand the science of sociology no less than the science of psychology. It may be said, in fact, that the sociological concept of education gives the humanistic or social point of view in commercial life, the point of view tending toward co-operation and better political and civic adjustments; whereas the psychological concept of education gives the individualistic and selfish point of view tending toward cutting competition in business enterprises, and a lack of solidarity in community life. As prerequisites to the social-group method of the teaching of English, the teacher must include in the teaching program scientific tests, supervised study and the use of educational equipment in the class room and in the library.

I contend that inasmuch as present-day methods in English teaching are almost entirely individualistic in aim, the English taught in the public schools of America cannot satisfactorily meet the requirements of industrial life. Some of the energy that teachers of English are expending upon a transfer of specific abilities should be expended in effecting in their classes such a scheme of organization as will be stimulating to the social nature of the pupils and lead to experiences that make for ideals. Teachers of English must endeavor to re-discover human nature as do engineers in all of their work. They must get away from the mechanics of their pedagogy now and then and strive with the business man and the engineer to rise to a higher level of social experience. One of the crucial tests of English in the commercial world is the test of letter writing. When the business man complains that his stenographer has not learned to write letters, he is saying simply that his stenographer has failed the crucial test of social fitness. The test is significant because it indicates not only the formal training but the social poise of the stenographer. English teachers fail to teach pupils to write letters satisfactorily for social and business purposes because English teachers fail to give a training favorable to the formation of the social ideals necessary to letter writing. What is needed in English teaching is a transfer of economic ideals from the industrial institution to the school room.

PHYSICS AND CHEMISTRY CONFERENCE

WHAT CONSTITUTES A GOOD COURSE IN PHYSICS.

PROFESSOR F. R. GORTON, MICHIGAN STATE NORMAL COLLEGE.

I shall divide what I have to say this afternoon into the three factors upon which the success of a high school course in physics is sure to depend; namely, the *means*, the *man*, and the *method*. Although much that may be said will be commonplace, it is presented in the hope that it may contain here and there a suggestion which will prove to be of service to some of the teachers of the subject who are present.

1. Means, or equipment.

We spend too much of our time, I fear, in meetings of this kind in discussing matters which are of little help to the teachers of physics and chemistry in the small high schools. We are continually sending to these schools splendidly equipped young men who from the very first must face the handicap of poor and inadequate facilities for teaching their subjects. For years this society has been advocating the equipping of laboratories and has succeeded, no doubt, in a great many cases; but, I feel that in some way we fail to impress upon many school authorities the great need of equipment. It is poor economy to secure a well-qualified teacher for any subject and then tie his hands by refusing him the proper tools for the work.

Many a young teacher do we find making most heroic attempts to present a satisfactory course by securing here and there in various ways apparatus which should be a part of the school's permanent equipment. We are sometimes asked to give teachers access to discarded pieces of apparatus which we might be willing to sell at a nominal price, although material collected in this way would be of doubtful utility. Every high school offering physics and chemistry needs systematic annual buying to build up a useful equipment, and an appropriation for this purpose should be as much a part of the annual budget as the allowance made for other supplies. No school board should suppose for a moment that an equipment can be made complete at once. It is most unfortunate that many school boards look upon appropriations of this kind as an amount donated simply to satisfy a whim of the teacher. Colleges are trying to provide teachers who are qualified not only to use apparatus, but to make wise selections and to purchase most economically. A high school is surely not receiving full efficiency of a well-prepared teacher when it has not awakened to the necessity of carefully chosen equipment for both laboratory and class use.

2. The Man.

Preparation and personality are factors of prime importance in any teacher, and especially so in the case of science teachers. The additional value which comes from experience is never of more worth than in that of the teacher of physics. The great wealth of material for use in illustration before a class opens broadly before the teacher of any school during the first few years of teaching experience. For this reason, if for no other, his value to a school should receive adequate recognition by the school board. The practice of securing a new teacher of physics every year or two is surely a point of doubtful economy.

Many a good course in high school physics is spoiled by the poor judgment of the teacher. A course can never reach a high point of excellence if the teacher makes too high an estimate of the mental attainments of his pupils. College students frequently comment upon their high school courses most disparagingly. "He always talked over our heads,' is a common report, presumably of the college-prepared teacher who is following college methods which will not apply to high school teaching. "My teacher was a stickler for mathematics," or, "Our teacher stuck pretty close to the text-book and problems. He didn't seem to care for experiments." These represent mistakes in judgment and method which even high school pupils discountenance.

The good physics course is sometimes spoiled by the improper distribution of time. The teacher permits so much time to be used in his effort to cover all the topics of some text-book, that at the end of the year he finds his work several weeks behind. The result is especially to be deplored since the loss to the pupil lies usually in the wealth of information contained in the closing sections which treat of the most interesting applications of magnetism and electricity. No topics of physics should be treated at the expense of other topics unless they have a close and important bearing upon the life and environment of the pupils, or a far-reaching effect upon the welfare of humanity. The human element which underlies any topic is, as a rule, the factor which determines the importance and emphasis with which it is to be treated.

3. The Method.

Before me is a report published many years ago, which says, in treating of the method to be pursued in teaching high school physics,—"It should show the close relation of physics to the practical affairs of everyday life." To do this has been the aim in every good course in physics since that time. However, present-day critics are goading us on to a recognition of a still closer union between physics and real life, by teaching the subject as a part of practical life. It is indeed encouraging that science subjects have so obvious a relation to the human race. There is little danger of their being depicted as simply "mental gymnastics," which have no place in the modern school; but rather as courses rich in information regarding nature and the

useful and practical processes which underlie the comfort and progress of humanity. It is the teacher's duty to so present the physics course as to make its value in this respect felt in the community.

A second sentence in this report gives another suggestion regarding the method of presenting a satisfactory physics course. "It should be so conducted as to awaken interest."

Physics courses fail in awakening interest from many causes. Close confinement to book and problem work, attempting to make use of broken-down apparatus, repeated failure of experimental demonstrations before a class, too much notebook work, emphasizing mathematical demonstrations and constructions,—all conspire to weaken the interest of the majority of pupils. The more we can bring our pupils into contact with real problems for physics to help them solve, the deeper their interest will become.

I sometimes wonder why we purchase expensive apparatus for illustrative demonstration, when the actual device to be illustrated would be much preferable. For example, a small cistern pump is worth far more than a glass model and is much more effective in teaching the operation of the common lift pump. The glass piston is not like a real piston with its leather packing; nor are the glass valves at all like the valves of a real pump. Besides, the very effort required to take a pump apart and examine it plays no small part in its teaching value. As a qualitive experiment for the laboratory, a commercial lift pump offers many valuable possibilities.

Again, much interest is created in the subject by introducing experiments dealing with the cost of fuels, the efficiency of cooking vessels of different materials, cost of lights per hour, and so forth. In many towns, meters, lamps, flatirons, and other devices are gladly loaned for educational purposes. The gas engine, also, offers unusual opportunity for bringing pupils into direct contact with practical things. Horse power comes to have a real meaning to a class engaged in making a simple brake test on a small farm engine.

It is true that the teacher in the small high school has not all the advantages offered by the city. He has not the chance to conduct his class through large shops and factories, perhaps, but he has the advantage of possessing pupils whose lives are not already saturated with the experiences usually acquired by the boys and girls of the city. It does not require the spectacular to awaken their interest, nor such a rapid change of program to hold their attention.

I thoroughly believe in the importance of the small high school. From them we secure many of our best students. It is probably due to the early handicap of lack of apparatus and material that these pursue their college courses with unusual diligence. Many of those who specialize in science subjects are those who become inspired in the work by enthusiastic teachers and not by fine equipments. Of the three factors it would be difficult to separate the teacher from his method. It is a good method which brings into

play all the available material which the environment offers, whether the school's equipment is much or little, and it is the good teacher who sees in the surroundings of his pupils material which he can use.

I believe the teacher of physics in the small high school has a rare opportunity. Many of the conventionalities incident to large classes may be dispensed with; his relations with local industries and the home life of the pupils may be especially intimate; and a close companionship between teacher and pupils can easily be developed. While I would urge the importance of well selected apparatus as a strong factor in the physics course, I would as strongly insist upon the fact that the use of illustrative material found on the farm, in the homes of the pupils, borrowed from the stores of the town, or made and collected by the pupils are all the more important because of the function they serve in practical life or on account of the effort required to find or produce them.

Although it is plain that a complete course can not be presented with material selected in this manner, and a method that dispenses entirely with regular physical apparatus is impracticable, applied ingenuity and effort on the part of the teacher in finding illustrative material will go a long way in making the work in physics a success.

ELECTRICAL MEASUREMENTS FOR SECONDARY SCHOOLS.

MR. G. I. ALTENBURG, HIGHLAND PARK.

The sciences of the public school today are without doubt undergoing more changes both in content and in method of presentation than are any other subjects. Our courses are more or less in a transitional state; we do not have centuries of experience and data to draw from, as do the teachers of Latin or the other languages. Our aim is two-fold. We must present work which has educational and disciplinary value and at the same time this work must be of a kind that will function outside of the laboratory and be of practical value to the student in an environment of applied science. Teachers of science and more especially of physical science, if they are to make their work of any practical value, have a continuous problem before them on account of the ever-changing conditions in our industrial life.

The high school work in physics must of necessity lag behind the many applications of physics seen in everyday life, but it must not lag too far behind. I believe the ideals of the physics teachers should be the following:

First, to teach the student to make generalizations from specific facts, or, in other words, teach him the scientific method of reasoning.

Second, to teach the student to understand natural phenomena under his daily observation.

Third, to teach the student to understand some of the commonest applications of physics, especially those found in the modern home.

To come to the subject of my talk, I believe that the electrical work given in the laboratories of most high schools at the present time could be made more vital and useful and still be scientific. The numerous uses of alternating current electricity in the home of today, even in the small town and in the country is surprising. Certainly more attention should be given in our laboratories to practical alternating current apparatus. We must, of course, see to it that our work does not degenerate into mere empiricism and become unscientific. Practical experiments can be substituted in many cases for those we are now performing and much real interest in our subject will result. I believe that it is fully as scientific to have my students determine the cost of operating an electric heater as it is to have them determine the internal resistance of a dry cell. Certainly the information gained from the former experiment is of more value in everyday life than that from the latter.

In general, it is fair to asume that the electrical work given in high school laboratories throughout the state can be pretty well determined from the laboratory manuals which are used. Approximately half of the manuals used make no attempt at work with alternating currents. Of the total number of experiments offered, only one in ten of them treats of the kind of electric current found in the student's home. Less than one in ten have any direct application in the home.

A need of more vital and practical work in electrical measurements seems to be felt in several parts of the country.

You are all probably more or less familiar with the monograph published by the Weston Electrical Instrument Company entitled "Experimental Electrical Testing." Another very good pamphlet dealing with applied physics in the home has recently been put out by the Bureau of Standards entitled "Measurements for the Household." Among the topics treated in the circular are: Heat, light, electricity, gas, water, atmospheric pressure and humidity, density of liquids, time.

The topic on electricity is very good and deals with the problems mentioned above. It is divided into the following eight parts, each of which is very suggestive and rich in material for home work by the student: Electrical units; Principle of the Watt-Hour Meter; Accuracy of the W. H. M.; Causes of high bills for electricity; Reading the W. H. M. dials; Checking the W. H. M. by the householder; How to have a W. H. M tested; Tolerance allowed for W. H. M.

In the past year I have tried out in my own physics classes several experiments of a practical nature and find that the students respond to them readily. And I believe that the knowledge gained therefrom will function outside of our own laboratory. Following is a list of suggestive exercises in applied electrical measurements for high school students.

1. Measurement of the efficiency of the different kinds of electric light bulbs in common use (carbon, gem, tungsten, etc.).

2. Parallel and series connections of electric lamps. Which is used in the home?

3. Carrying power and function of fuse plugs. How rating of plugs are shown.

4. Cost of operating and efficiency of an electric flat-iron.

5. Determination of the correctness of the commercial rating of an electric heater, (toaster, disk stove, flat-iron or percolator may be used).

6. Electric and gas meters found in the home and how to read them.

The following are home exercises to be performed and reported upon by the student:

1. Find cost of operating a certain number of lamps for one hour by two methods: (a) Power consumption from the number of lamps burned and the wattage of each. (b) Power consumption from meter readings taken before and after experiment.

2. Determination of the accuracy of the W. H. M. in the home.

3. Determine number, carrying power, and location of fuse plugs in the home.

4. Compare cost of heating a known quantity of water to the boiling point on both gas and electric heater. (Read both meters before and after experiment.)

CHEMISTRY IN THE HIGH SCHOOL AS PREPARATION FOR CHEMISTRY IN THE UNIVERSITY.

DR. ALFRED L. FERGUSON, UNIVERSITY OF MICHIGAN.

The topic which I am to discuss this afternoon is but one phase of a much broader subject. This subject is evident as a strong undercurrent in all meetings of this club and comes to the surface occasionally as it has today. When a superintendent or a school board undertakes to revise their existing curriculum it again manifests itself and exerts a strongly determining influence. I am referring to that perpexing question, to what extent shall the high schools function as preparatory schools for the University? Should our system of education be such that the courses of study in our high schools shall prepare the young people of the state for more advanced education or should it be such that the courses of study shall meet the special needs of the particular communities in which they are located? And I take it that the present pronounced trend towards the practical and commercial in education has added new interest to this topic.

It is not for me to discuss this question here today, but I do wish to point out that the attitude taken by each superintendent and school board

on this question has a decided influence on the nature of the instruction given in chemistry in that school. If the superintendent and school board believe that the school should serve the community first, then the courses of instruction will be moulded to meet the special needs of the community. This is especially true in the smaller towns and cities where a large percent of the enrollment is made up of rural students. These are the schools that have felt more forcibly this wave of practical education in the form of courses in agriculture, and this innovation of instruction in agriculture has had a decided influence on the lack of preparation shown by students in chemistry when they continue their work at the University. In many schools where agriculture has been introduced, the regular course in chemistry has been displaced by a course called agricultural chemistry. In other schools the course retains its original name but the nature of the instruction given has been altered to meet the demands placed upon it by the course in agriculture. This new departure in chemistry had only nicely started when I dropped out of high school teaching so that I can not speak from experience concerning the exact nature of the work being given in chemistry in schools where agriculture has been introduced. But from conversations with several who are teaching in such schools I have gained the impression that the courses in chemistry have strayed far away and are by no means fulfilling the purpose for which they were originally intended.

When Mr. Clark invited me to speak at this meeting, he suggested three specific points which he was certain the teachers of chemistry in the high schools would be especially interested in having discussed. These are: first, what are the things in which students who present a year of high school chemistry for credit when they come to the University generally weak? Second, what are the points in which they are sufficiently well prepared? Third, what is expected in the way of preliminary preparation of the students by those teaching the subject in the University.

It would appear that Mr. Clark expects me to assume that the schools, in which these teachers are working, are endeavoring, as a part of their task at least, to prepare students for the University. So that my remarks will be in the main for the benefit of those teachers who desire to have their students prepared at least to continue work in chemistry at the University.

Let us consider the topics in the order given. First, in what respect are the students generally weak? There are so many factors which enter in to determine how well a student is prepared to continue work in chemistry at the University, that an entirely just and adequate answer to the question is not possible. In the first place there are three courses given here which presuppose a year of chemistry in the high school. Each course is designed to meet the needs of a special class of students. The course *2b* in our catalogue is designed primarily for students in the College of Literature, Science, and the Arts who wish to continue work in chemistry. It is an elective course. The course listed large A is for students taking Dentistry and Phar-

macy. This is a required course in these departments. The course listed 2E is required of all Engineering students. The first mentioned course may be elected by any literary student during any of his four years at the University. The last two courses are in general required of the students either the first or second semester of their freshman year.

Two students who have been equally well prepared in the high school may not be equally well prepared when they continue their work at the University. It must be remembered that two of these courses are required of all students in their respective departments, while the third is elective and would naturally be taken by students who like the subject and who stood well in it in the high schol.

Frequently chemistry is given in the junior and often in the sophomore year of the high school; and students often are out of school from one to several years after graduation before entering the University. These facts must make it evident that the lack of chemical knowledge shown by the students entering these three courses may not be attributed entirely to a lack of preparation in the high schools. But, after all these points have been considered it still remains that a large proportion of the students are sadly deficient in the knowledge and training which we feel we are justified in assuming they possess. They have no conception of the real significance of chemistry. It is hard to find one who can converse intelligently in the language of chemistry.

When a student begins the subject of chemistry in the high school it is similar to beginning some foreign language. Chemistry has a language of its own and it is just as essential that a student should learn the a, b, c's and the terms which make up this language before he can talk or read or have any conception or appreciation of the real significance of the field of chemistry, as it is that he should learn the vocabulary and grammar of a foreign language before he can really appreciate the literature of a people using this language. It is possible to give a man a partial vocabulary of some language, and a corresponding list of English words which convěy practically the same meaning, and having learned these lists he may be able to translate into English with more or less accuracy the ideas expressed in some article, but he could have no appreciation of the hopes, ideals, ambitions, etc., of these people as expressed through their literature. In a similar way a student may be given the meanings of a few terms in the language of chemistry and he may then be able to translate more or less accurately a book on chemstry and yet not have much conception of the subject itself. This I fear is too often one of the serious difficulties in our high school work.

As near as I can learn, the teacher in the high school during the first few weeks of the course in chemistry dictates to the students certain sentences which represent in the language of the student the meanings of several chemical terms and phases; or, what is more common, the teacher asks the student to memorize such sentences as they are written down in some

text. In time the student is able to repeat these sentences, and in most instances with about the same degree of intelligence as the parrot. The teacher then assumes that the student is ready to take up the literature of chemistry. And in some schools he is started in the so-called practical chemistry as applied in agriculture and domestic science, and continues to do this kind of work throughout the remainder of his high school course in chemistry These students then come to the University and offer a year of chemistry for entrance credit and expect to enter one of the three previously mentioned courses.

Last semester some of my students told me they had more chemistry in the high school than we covered in 2E at the University, they claimed to have analyzed such substances as milk, baking powder, soil, samples of ores, etc. Yet these same men could use hardly a single chemical term intelligently in a conversation.

Many of the factories employ men whom they call chemists, these men in many instances have never attended school beyond the eighth grade and have never seen a text-book on chemistry and in fact know absolutely nothing about the subject of chemistry yet they make analyses of ores, of steels, of gases from coke ovens, of syrups in sugar factories, etc., and do it better than a professor of chemistry from the University. They are given a set method of procedure which if carried out accurately will give the desired results, and the more like a machine they are the better their results will be.

During the last half of our course in 2E we spend the greater part of the time studying reactions of metallic salt solutions with various common reagents. This work has two main objects, first to illustrate and study various types of reactions and various principles that have been encountered earlier in the course; and second, by a comparative study of such reactions the student is able to discover for himself new generalizations and new principles. These new generalizations and principles are then applied in the analysis of unknowns.

Frequently students tell us they have done experiments of this nature in the high school and they bring notebooks containing a lot of equations, frequently about as many as we require of them, and some form or other of outline for qualitative analysis. This all looks very well on the face of it, but when we start asking questions on the types of reactions and the principles illustrated by some of their equations, or the principles that should be in mind in writing these equations, or the generalizations to be formulated from a comparative study of several series of such reactions, or the principles on which the scheme for the analysis of an unknown is based; when we start asking such questions, I say, the student is completely at sea; he does not even understand what we are talking about. This shows the kind of information and training these students have had, and it shows that when it comes down to the real fundamentals of chemistry they are miserably lacking.

When the students begin our laboratory work, with but few exceptions, they start out by following the directions more or less accurately as they are given in their laboratory manual and they make note of the most evident changes that they observe and with this their efforts cease and they are ready for the next experiment. They are lacking in any sense of keen observation, they fail to see any connection between the experiment they have just been performing and anything they have done in an earlier experiment or anything they have read in the text-book or heard in the lectures. They never assume a critical attitude and ask themselves why they were directed to do that particular experiment, why did the materials behave as they did, and what is to be learned from such a reaction.

About our biggest task is to overcome this lack of mental activity on the part of the student. The time for students to acquire such training is when they start their laboratory work in the high school. The teacher should insist that the students do their work critically, they should cultivate in the students a keener sense of observation, they should assist the students to form a habit of correlating the knowledge gained from their text with that gained in the laboratory. I admit this is a difficult task, but the high school is the place where it should be accomplished. It is there that the teacher has the time, and because of the relatively small classes the teacher can give the necessary individual help. It requires constant supervision, constant inspection of laboratory work, constant quizzing and personal attention. Furthermore, it naturally presupposes that the teacher has had sufficient training himself in this line and that he has an unlimited supply of patience and perseverence, requirements that I fear are too frequenty lacking in many of our high school teachers.

You may reply that you do not have time to cover all the experiments in your laboratory outline and do them in the thorough way suggested. I grant that is true in many instances. But the trouble is the outlines include too many experiments and in most cases cover too wide a territory.

It is my opinion—and I have the support of the other members of the general chemistry faculty and of Professor E. D. Campbell, director of the chemical laboratory,—that most quantitative experiments have no place in high school work. It may surprise some of you to know that such experiments have been discarded from chemistry 2E here at the University. Most of them defeat their own ends. They are introduced to prove some law like the law of definite proportions, but tell me how many of your students obtain results sufficiently accurate to prove to themselves the truth of the law. The students can not appreciate the care and accuracy required in such measurements. If you insist on such experiments let them be done by the teacher, before the class, and if he has sufficiently pure materia, sufficiently accurate balances, and is a sufficiently careful worker himself so that he is sure he can secure results that will warrant the conclusions he wishes to draw, all well and good.

Now let me ask you also what end or ends you have in view in giving the experiments often found in the laboratory outlines or given in special outlines on the reactions of the metals. I can see but three: 1st, you may feel that the student should be equipped with a knowledge of these reactions, and should have some experience in working unknowns when he continues work in college; 2nd, you may have in mind preparing him to do practical, analytical work; or 3rd, you may wish to make use of these reactions to illustrate some principles which he has been studying in the text or to serve as a basis for the development of new principles and generalizations. If the first is your aim permit me to inform you that the University makes no such demands. The University will be perfectly satisfied and in fact would be more pleased if this work on qualitative analysis were eliminated from your course in high school chemistry. If the second is your aim, let me ask you how many of your students are able to make an intelligent and satisfactory analysis of any naturally occurring or manufactured substance. I claim that if this practical end is the thing for which you are striving then the results do not warrant the effort. If the third is your aim and if you actually succeed in what you attempt then that is well, but I should not advise a sacrifice of time for the other work even then.

The second part of this discussion is in answer to the question, on what points are the students sufficiently well prepared. This has been partially answered already. It might be said in addition that they are sufficiently prepared on the facts pertaining to the descriptive chemisry of the non-metals. To be more explicit they show a fair general knowledge of the occurrence, methods for preparation and characteristic properties of oxygen, hydrogen, chlorine, nitrogen, carbon and sulphur; and the chemistry of some of the common compounds and mixtures of these elements such as water, the atmosphere, hydrochloric acid, ammonia, carbon dioxide and sulphuric acid. They are frequently able to state some of the more simple laws but are seldom able to use or illustrate these laws, unless it is with the possible exception of the laws relative to changes of gas volumes with temperature and pressure, and these pertain more to physics than to chemistry. In other words, they show a reasonable knowledge on those topics which require an exercise of the memory only. But it is seldom that we find a student who has a clear, definite, and accurate idea of the significance of the terms which he must constantly use such, for instance, as chemical change, mixture, compound, substance, formula, symbol, equation, valence, atom, molecule, solution, neutralization and a host of others. They can not tell from the name of a compound or from the appearance of a formula whether it is an acid, base, salt, or an oxide; they appear to know nothing about the different types of reactions that take place by various combinations of these four classes of substances. They have no conception of the theories and many of the laws of chemistry; such, for instance, as the atomic theory, the molecular theory, and the ionization theory, the law of mass action, of combining volumes, of

combining weights, of multiple proportions. They have made no classifications, no generalizations to assist them in remembering and interpreting the facts of the subject. To do this last requires that they do at least some thinking for themselves, and right here is where the great difficulty comes in, and it is a difficulty not only with the teaching of chemistry, but it permeates the whole work of the high school. I refer to training the students to think for themselves. This is a difficult task but I believe it is the greatest service the high school can render its students. The many facts which are packed into the heads of high school students will be in a short time to a large extent forgotten, but any training to think for themselves that can be given the students will stick by them and be an asset throughout life. Chemistry is one of the best subjects in which there is an opportunity to develop such training and such training is the best preparation that a student can have for further work in the subject, and furthermore it is the best preparation he can have for any line of work he may pursue outside of school.

Concerning the third point, namely, what is expected in the way of preliminary preparation of the student, but little more need be said. I might draw your attention to the statement of requirements as given in the University Catalogue. On page 109 of the 1915-16 catalogue you may find this statement, "The unit in chemistry covers the information which should be acquired in one year by a study of Brownlee's, Hessler and Smith's, Linebargers', McPherson and Henderson's, Newell's, Remsen's or other similar texts. The study of the text should be accompanied by laboratory work done by the student." But the key-note is here in the next sentence, "A thorough working knowledge of a few fundamental principles is more to be desired than a superficial knowledge covering a wider range." If the high schools would furnish us with students who have "a thorough working knowledge of a few fundamental principles" we would have no complaint. But many do not grasp the real significance of the expression, "a thorough working knowledge." It means that students must be able to do more than recite in parrot-like fashion a list of definitions, laws, principles and theories. They must show that these have a real meaning to them, that they have been completely assimilated and made a part of their working knowledge. The students have acquired this desired end only when they are able to give good illustrations of these definitions, laws and principles, when they are able to work exercises and solve problems in which they are involved. The very best training for the students is the working of exercises and problems, or anything that requires an application of the knowledge they are expected to have. Questions can be so framed that the answers require a process of reasoning and an application of the thing you are trying to get the students to learn. Students' questions may often be answered by asking them others till they are led to answer their own. It should then be pointed out that they might have answered their own question without your assistance had they stopped to think for themselves. This is the kind of teaching that really pro-

duces results, but there are altogether too many teachers who are unwilling to exert the effort which such teaching requires

Permit me now to review in a brief summary some of the points I wish to make in this discussion. It is evident to all of us that the high schools have two masters. The University insists that they fulfill certain requirements if their graduates are accepted without condition. The community in which they are located, on the other hand, insists that the students be given a practical education. Under present conditions it is impossibe for many high schools to fulfill both requirements, not but what they would be glad to do so, but circumstances will not permit. If one is done satisfactorily it is often accomplished at a partial or total sacrifice of the other. We realize this condition, and we appreciate the fact that every school would be glad to meet our requirements, but this does not alter the fact that the standard of these requirements must be maintained. We must insist that the students be well grounded in the nomenclature of the subject, they should be able to use intelligently the various terms which go to make up the language of chemistry and in which the literature of chemistry is expressed. They should have a thorough working knowledge of a few fundamental principles. We advise that an attempt is not made to cover in a superficial way the whole field of chemistry, but rather that a thorough drill be given on the foundations of the subject, with special attention directed to the subject matter in some good text especially as far as the metals. Accompany the work with many exercises and problems that require the students to apply their knowledge. As to the laboratory work, it is advised that practically all quantitative experiments by the students be eliminated; that work on reactions of metallic salt solutions and the analysis of unknowns be given very sparingly; that steps be taken to prevent the laboratory work from becoming mechanical and to encourage a critical attitude.

As to the preparation which students show when they enter courses at the University a single general statement might be made that comes close to expressing the situation. The students are satisfactorily prepared on those points that require only a use of the memory, and are not satisfactorily prepared on that far more important type of knowledge which requires the use of their own powers of reasoning.

I do not wish to convey the impression that I am opposed to the present trend of education in our high schools toward the practical. On the contrary, I consider it a change for the better if it is not carried to the extreme. But I do maintain that students who have taken the practical courses in chemistry should not expect to enter a course here at the University that presupposes a year of chemistry in the high school. Such students should elect courses 1 and 1*a* which are beginning courses I shall state frankly that it is my opinion, and the opinion of several other members of the chemistry faculty, that students who contemplate continuing their education at the University would do well to omit chemistry in the high school.

In this discussion, I have assumed that you are here with an honest desire to learn what the teachers of chemistry at the University expect you to accomplish in the high school and to learn to what extent they think you are succeeding. Their judgment being based solely on years of experience with the product which you furnish. I have been frank and honest in imparting this information and trust that it will be received in the same spirit, and thus by this and future discussions the student may profit.

THE TEACHER OF PHYSICS---HIS PREPARATION.

MR. H. N. CHUTE, ANN ARBOR.

It may seem like a conceited ambition for me to discuss at this time and in this place the preparation of a physics teacher, seeing that I am not a product of the modern system, having simply come up Topsy-like. So to any who might feel disposed to curl the lip, I would say as the old Scotch minister did to a few of his parishioners as they carried him home from the inn where he had tarried until his equilibrium was no longer stable,—"Never mind the lantern, (hic) boys, but follow the light."

It is not my purpose to tell how poorly physics is taught, nor how inadequate is the preparation of the average teacher, for neither of these propositions would be generally true. So far as I know, the science teachers are as well fitted for their place as are those of any other subject. Most of them could be worse, all of them could be better. What I shall say may be of little value to the veteran, but may be suggestive to any about to be initiated. If of no value to either, relegate it to the limbo of the forgotten, and may no one be worse from the ordeal of listening.

So without apology I proceed to my task, and state as my first proposition, to wit, that one would be better equipped to teach physics if he had studied the subject largely along its lines of development, as followed by its great exponents, for these are likely to be the lines of least resistance. It was Faraday who said that "he was never able to make a fact his own without seeing it; and that the descriptions of the best works altogether failed to convey to his mind such a knowledge of things as to allow him to form a judgment upon them. If Grove, Wheatstone, or Gassiot ever told him a new fact and wanted an opinion either of its value, or the cause, or the evidence it could give on any subject, he never could say anything until he had seen the fact. For the same reason he never could work, as some do most exclusively, by students. All the work had to be his own." In this confession, we have the explanation of how he came to make so many valuable discoveries. When he read how Oersted had discovered that the electric current deflected the magnetic needle, I have no doubt that he lost no

time in repeating the experiment. As he pondered on the cause of the needle's deflection, he asked himself the question, "Why does it rotate but part way?" "Why is the motion not continuous?" "Why does it move at all?" I can imagine that he repeated Arago's experiment and saw the iron filings clinging in whirls about the wire when it was carrying an electric current. He saw at once that there were two magnetic fields, that of the needle and that about the wire, and concluded that motion was due to their mutual action. But why did the needle stop at an angle to the wire? A little consideration brought out the fact that the two parts of the wire acted in opposite manners on the ends of the needle, and that the position assumed by the needle was due to the balancing of the forces. He saw at once that this balance would be destroyed if the needle had but one active pole, and that under such a condition the motion would be continuous. To think, with Faraday was to follow by action, by experiment; so we find him placing the pivoted magnet so that the current was parallel to but half of the needle and continuous motion was the result; he had invented the electric motor. This narrative may be fiction in part, may not be exactly scientific in its manner of statement, yet in reading the Life of Faraday I find this to be his method of work, the manner in which he developed the important truths that formed the substance of his teaching at the Royal Institution. I believe his methods to be those that every teacher and investigator of science must follow if he expects to interest his pupils and make clear to their minds the principles of the subject. Faraday repeated all experiments, no matter how simple; on these he pondered until all the underlying principles were clearly and logically arranged in his mind. Now, it was easy to make them clear to others; and in all probability he would have met with failure, partial at least, if he had not subjected himself to such a régime. Faraday was a prince among teachers. Every teacher should read his biography. No better book on pedagogy has ever been written. His methods were simple and effective. He always rehearsed his experiments beforehand, no matter how simple; he never told his hearers about an experiment but he showed it to them. He said to a young lecturer once:—"If I said to my audience this stone will fall to the ground if I open my hand, I should open my hand and let it fall. Take nothing for granted, as known; inform the eye at the same time as you address the ear." Hence, my point is,—the road for the successful teacher is to begin by filling his mind with the experimental facts of the subject; these he must prove to himself by experiments actually performed; and before any experiment is left or passed by, he should determine the best conditions for its successful execution, and make the whole subject clear to his own mind. But above all things avoid failure in repeating an experiment. Nothing but practice and eternal vigilence ensure success. And, if perchance, failure should come, search out the cause, point it out to the class, then remove the cause and carry on the work to success. Do the latter for the moral effect, if for no other.

My second proposition is,—that the teacher of physics must do more than fill up on facts, laws, and formulæ. He must be put through a laboratory, either that of a college or high school or both. The work that he does should not be simply the work of the college course; he should do that of a high school course, if he has never done it before, the actual experiments of the class room and the laboratory of the high school, and that with apparatus of the quality usually found in schools, such as schools will buy and are found dependable in the hands of the nondexterous. To do otherwise, and that is the prevailing practice, does not seem to be the zenith of wisdom. In the college laboratory you had a $100 spectroscope placed in your hands with which to measure the index of refraction of glass, whereas in the high school laboratory you may have a horn protractor and an advertising ruler of doubtful straightness with which to solve the problem. In college with an elaborate apparatus so complex that only the professor could make the adjustments, and you had to content yourself with looking through the telescope when he announced it ready, you read what you were told to read, measured what you were directed to measure, twisted the results as you were told, and obtained as you were informed the vibration rate of a fork. In the high school you have a fork costing a dollar and a half, but find yourself unable to determine its rate for you have learned no way adapted to the facilities of the place. Is it not true that too often the work of the school is too far removed from what the individual will be called upon to do, that he will attempt to foist college laboratory methods on the pupils, or give up in despair and do nothing worth while?

For my third proposition I shall assert that the teacher should know his subject somewhat beyond what he is expected to teach. It is a familiar saying in hydraulics that water in a pipe will rise as high as its source, but when deprived of the pipe and left to spout into the air it falls far short. The deeper one's knowledge and the more extended his information, the higher will be the plane to which he can carry the interest and enthusiasm of his class. If one knows but little and is not very certain about that, many a pitfall awaits him, prepared by some bright and mischievous one of the class. Too many learn the forms of teaching, are able to expatiate at length on the bearings of psychology on the functions of the brain, but when they talk on physics, mix force, energy, power and so forth in hopeless tangle.

Whatever one teaches, he should possess at least a few of the standard books on that subject and access to many more. Some of these should deal with its history and growth. The stories and incidents about scientific men, how they came to investigate this or that particular phase of physics, are matters of much interest. All such incidents are as cement to a wall in that they fasten things together in a student's mind. The discovery of the laws of vibrating strings by Pythagoras has an added interest when one comes to know that his attention was directed to the question by noticing one day as

he passed a blacksmith shop that different anvils gave out different sounds when struck. Archimedes noticed while bathing that the quantity of water which overflowed from the bath tub was a measure of the volume of his submerged body. This incident, so familiar to you, started a line of study and investigation which led to the determination of density by means of the principle bearing the name of this great philosopher. It was the swinging chandelier seen by Galileo at the evening service in the Cathedral of Pisa, and timed by his pulse, that gave him the idea of the pendulum. Descartes, the mathematician and philosopher, noticed the beautiful colors of the rainbow, how that they resembled in appearance and in order those produced by glass prisms. So he set himself the task of tracing, geometrically, rays of light through circles representing drops of water, and after tracing about two hundred such rays, incident on all parts of the circle, discovered that interesting fact that at a certain angular distance from the axis of the drop, different for each color, the incident rays suffered the least deviation from parallelism on leaving the drop, and so had sufficient intensity to give the color observed. The dry and difficult subject of falling bodies would have added interest in the incident of Newton's observing the falling apple, and how it set in action a train of thought that led to an explanation of the solar system. Torricelli's effort in trying to account for the non-action of a pump, led to the discovery of atmospheric pressure. Dalton's exhibition of himself in flaming red stockings, innocently believing that they were black, resulted in the discovery of color blindness. Alexander Bell when a boy went to see a talking machine, the invention of Faber. This was one of the incentives that led him to develop the telephone. The story of the birth of the Edison phonograph is replete with humor and instruction. These illustrations are sufficient to show that the history of physics is full of interest. Such books as Routledge's History of Science, Buckley's History of Natural Science, Lodge's Pioneers of Science, Dr. William's History of Science are necessary books in every physics teacher's library. There is another kind of reading which I wish to commend. Every teacher of experience knows how often he is at his wits end to make plain to some determined boy or girl who may be lacking in imagination the explanation of some everyday phenomenon. Dating back several years there has appeared from time to time, chiefly in England, reprints of popular scientific lectures by noted scientists. These I have found rich in simple illustrations; and by studying them I have been able to catch in a measure the spirit of their method and devise other illustrations, and in this way have been greatly helped in my work. As aids to the pedagogy of physics I believe them to be the best to be found. The fact is that a teacher of physics without a library to which he is continually adding more books is a failure of necessity.

In the fourth place, the teacher of physics should be able to draw. It is not necessary to be an artist, but it is necessary to be both a physicist and a mathematician to be a competent artist, if ludicrous blunders are to be

avoided. If Hogarth had been properly educated he would not have been guilty of drawing a picture of a barrel showing both ends. If many others had stayed longer in school, they might have known the shape of the new moon, neither would they be guilty of putting three o'clock shadows in a nine o'clock picture. Drawings should not be misleading. Plain figures showing plan or arrangement of parts of the machine or piece of apparatus are very helpful. Colored chalk is an excellent substitute for perspective.

In the fifth place, the teacher of physics must be a fair mechanic, must have quite an acquaintance with tools, some ideas about the methods of doing things. He must not be afraid to work, must be willing to devote at least part of his vacations to the construction and repairing of apparatus. A book like either Threlfall's or Woollatt's Laboratory Arts must be his daily companion for a while. Experimental work rests ultimately upon the mechanical arts. The abilty to adjust, take apart, assemble properly a piece of apparatus is absolutely essential to success. Rarely does one receive from a dealer or manufacturer a piece of apparatus that is ready for use. Either wires are broken, parts fit badly, or something has been bent in transit. I remember receiving two galvanometers from a well-known Eastern house, neither of which would respond when in circuit. On dissection it was found that in both instruments, the terminals of the helices had been connected to the binding posts without removing the insulation, and then hid from view by embedding in sealing wax. Connections within resistance boxes often break and can be repaired without sending away, if the use of a soldering iron is understood. That much apparatus is but a synonym for mechanical depravity is alas too true; but it is equally true that often the failure to perform is caused by the ignorance of the operator. The teacher who writes to the manufacturer to know what liquid goes in the jars on the front of the Holtz machine, or uses a gravity cell to operate the electric signal bells of the school, cannot hope to pilot his students very clearly through the subject of physics, neither can he expect that his School Board will be very enthusiastic over any requests for apparatus that he may think he needs.

Finally, shall I say "forget your pedagogy"? Do not misunderstand me. I would not disparage the study of the science of teaching, but I would have every teacher remember that he may know Page and Payne, Bain, Hinsdale, and Harris, and if he does not know physics both experimentally and theoretically, failure is likely to be the outcome. What I mean has been well said by Dr. Hall of Harvard,—"There is a danger that over attention to the theories of pedagogy and the propositions of Psychology, one may evolve such a ponderous system of mental machinery as to preclude all effective instruction. The abstractions and phrase-makings of normal training injected into the school room drive out clearness, and prevent intellectual contact with your pupils.

It is told of Ole Bull, the great violinist, that one evening as he strolled along a back street in a certain town, he was attracted by the strains of his

favorite instrument issuing from the window of a house over the way. The sweetness of the music induced him to look up the source. Pushing open the door in obedience to a gruff "come in," he found himself in the presence of a red-headed Irishman, seated in a rickety chair. Entering into conversation with him, he asked this wielder of the bow, "Do you play by note"? "No." "Do you play by ear"? "No." "How do you play"? "By main strength and awkwardness, sor." The secret was, the man was full of music, and it could not help but come out, even where given but half a chance. And so I say at this time, that the best preparation for a teacher in any subject is to fill up on that subject so that he runs over. A judicious training in the science of teaching will enable one to do still better and with less misapplied energy, but will never take the place of lack of knowledge of the subject.

MATHEMATICAL CONFERENCE

SHOULD HIGH SCHOOL MATHEMATICS BE DIFFERENTIATED FOR PRACTICAL AND CULTURAL PURPOSES?

MISS ESTELLE NASH, ARTHUR HILL HIGH SCHOOL, SAGINAW.

In order to answer this question, let us examine the cultural purposes of mathematics, and those that may be called practical, and then separate the practical and cultural parts of the subjects, and from these observations determine what kind of courses our practical and cultural courses would be. If differing widely, we would be justified in answering our question in the affirmative; if not, in the negative.

First, among the practical purposes for high school mathematics let us place the preparation for courses in higher mathematics which will fit one for such lines of work as engineering, navigation, and numerous other occupations in which higher mathematics is needed. The only other practical purpose which we will consider is immediate preparation for work in the trades.

One of the purposes of mathematics which we shall call cultural is the cultivation of mathematical habits, such as neatness, system of orderly arrangement, accuracy, persistence, economy of thot, brevity and precision in expression, and mathematical reasoning which includes the selection of essentials and the neglecting of non-essentials in an argument. Another cultural purpose is the pleasure derived from the delight in symmetry of form, and from contact with absolute truth—from an appreciation of the fact that mathematics, especially Geometry, is a God-made and not a man-made subject. Culture also includes intelligent appreciation of positive human experience. One needs some mathematics in order to understand the material in the daily newspapers, to read trade journals intelligently, to interpret the numerous graphs that one sees in journals, weather reports, and statistics of various sorts.

Briefly then, we are classifying as practical purposes of high school mathematics those benefits which prepare him for his life work, or for studies which will prepare him for his life work, and as cultural, those benefits which will enable him to enjoy life more, and to more thoroly appreciate various lines of human experience.

For the parts of high school mathematics useful for these practical purposes I will quote from the report of the committee on vocational mathematics to the Central Association of Mathematics and Science Teachers of 1914 and continued in 1915. At the head of the list we find the equation as it is adapted to the use of formulæ, then follow in rapid succession, geometric

constructions, various uses of the graph, the use of logarithms, and trigonometric solutions of the triangle. Answers to questionnaires concerning mathematics courses, sent to various vocational schools contain such statements as "courses in practical mathematics including algebra, geometry, and trigonometry" and there was practically a unanimous opinion that their mathematics is almost identical with that of an academic high school. Even for domestic science courses, general mathematics was advocated which would include from algebra the equation as applied to formulas, graphs for daily temperature, oven temperature, calories in daily food, yearly expenses, temperature and humidity; and from geometry, straight line figures for drawing of all kinds and drafting of patterns, designing for carpets and linoleums, and curved figures for designs, mouldings, etc., even some solid geometry for tank volumes, etc. The general feeling, so far as could be ascertained by this committee, was that the best course in mathematics for the vocational student was "one somewhat general in nature." For what is required in a course in vocational mathematics, I also consulted the mathematics teacher in the Arthur Hill Trade School, Saginaw, W. S. This year they have shortened the course in algebra from ten months to five, and this necessitates omitting a great deal. They give graphs, ratio and proportion, and study the equation as a means to the solution of formulæ. In geometry they omit symmetry and many of the theorems they use without proving. In trigonometry they omit trigonometric identities and some other parts, placing the main emphasis on the solution of the triangle. The brevity of the course in algebra in this school is caused by lack of time and not by the teacher's believing that that is all the students need.

In laying out a course in mathematics for culture, one would not leave out any of the topics but would perhaps omit some applications. Extracts from the history of mathematics would be introduced, and some of the difficulties encountered and overcome would be discussed and the beauty and wonder of it would be dwelt upon. To my mind what is practical for one is cultural for another. For the majority of students it is cultural to learn that mathematics has practical uses. As an illustration, consider the computing of the distance from an accessible to an inaccessible point, as doubtless many of your geometry classes actually do out of doors. For a few this may be a practical problem in that they may use it in their future work, but for the majority of the class it is a cultural problem because it teaches them that geometry has some practical value, and because it helps them to appreciate—to a degree—the work of the surveyor. Graphs are both practical and cultural depending upon a person's occupation. As another simple illustration of what is practical for some and cultural for others, we have the area of the parallelogram. In connection with this, I asked my classes how to measure cloth in order to give a customer ¼ yard cut on the bias. To my surprise, the boys were more interested than the girls, but I am sure it is a problem which is practical for some in the class and cultural for others.

Some educators of prominence are of the opinion that in the high school we should offer different courses in mathematics for those who expect to enter college and for those who expect to enter the trades, the difference not to be so much in the selection of topics as in the presentation and applications. This, however, would be making a distinction in the work between the two purposes which I have chosen to call practical. A difficulty will arise here from the fact that so many high school freshmen do not know what their life work is to be and hence are not in a position to decide whether they want a practical or a cultural course in mathematics. The different courses may come in time, but it is my opinion that the high school course in mathematics should be a well-rounded course—both practical and cultural, presenting things that some will actually use, and whose uses others will learn to appreciate, and that the topics should be presented in such a way that all students would know how to apply them when needed and would also receive the cultural benefits of the mathematics they study.

IS IT POSSIBLE FOR HIGH SCHOOL MATHEMATICS TO FUNCTION DURING THE PROCESS OF LEARNING?

PRINCIPAL N. C. NIELSEN, CHARLOTTE, MICHIGAN.

The question, "Is it possible for high school mathematics to function during the process of learning?" challenges our attention as teachers of mathematics in secondary schools. We live in an age peculiarly dominated by practicalism and attempted standardiaztion. A large school of educators seeks to discredit any value in formal discipline. Therefore in considering this question it becomes necessary for us to approach the subject in the light and spirit of a golden mean between two extreme schools. No attempt is made to establish a claim of priority for mathematics. However, the functioning of mathematics in the process of learning must be tested by results, acquired through the mastering of the technique and the content of the subject and its application in life.

Mathematics is a characteristic type of thought. A glance into the history of mathematics reveals the interesting fact that down through the centuries and among all peoples, the same conclusions and results have always been obtained regardless of the system of counting or computing used. These results seem to be universally ingrained in the minds of people and differ only in extent. There can be little question but that like results will be attained by the individual student in the process of learning.

Modern psychology is beginning to make clear the value derived from habit formation. The study of mathematics fosters certain habits and offers

an excellent opportunity for laying the foundation of this indispensable asset to our mental beings. Men in business, men occupying responsible positions will invariably tell you that to succeed in their field requires individed attention to the task in hand. The student of mathematics is challenged to give the subject his closest attention if he would progress. The subject matter is especially suited for cultivating and developing this habit. The slightest lapse of attention is fatal to correct results. Thus mathematics functions during the process of learning as a corrective of any tendency toward mental detraction from the subject in hand, at the same time fostering the habit of giving concentrated attention.

The subject matter and the method of instruction must be adapted to the needs of the individuals in the class. Adaptation should be the one central objective in mathematical instructon. To overtax and to overburden the class is to tread dangerous ground. At first give to the class simple problems and exercises which may be handled with certainty, freedom, and comprehension. This will not only instill self-confidence in the individual student, but will simultaneously narrow the path of discouragement.

Oral work serves as a stimulus to quick and accurate computation. The student must do the work himself, independent of aid of pencil and paper. It requires active concentration of thought for every operation and result must be kept in mind. To do this is a training in itself. It trains one to plan and act quickly and develops a mental alertness and keenness

It is said habits are formed by repetition. Speed and accuracy are habits which may be acquired only by constant drill in the fundamental operations, combinations, and simple fractions. That the student should be thoroughly familiar with the squares and cubes of numbers commonly used and with the roots of these number is highly desirable. Such work insures ease and facility in computation, the need of the day. Make the work intensive rather than extensive.

Let us consider the subject of Algebra for a moment. Factoring is of vital importance. More emphasis must be placed upon it. In Algebra, constant work in factoring and use of type forms will afford the student a working knowledge of these, and a confidence in his ability to use and apply this knowledge. Future work becomes easier because the essentials have been mastered like the multiplication tables. I visited an Algebra class last semester doing this sort of work. Interest ran high. Young people are interested in doing things if they see and understand them. In this class there was evidence of power and ability. They were acquiring the habit of how to do mental work. Work of this sort dispels mental loafing and lagging. Oral or mental work is a field for definiteness by virtue of its simplicity.

If the mechanical parts are developed in this way as they are needed it will prepare the student for the equation. Give equations that will admit of solution and application. These simple equations will help to acquaint the student with the difference between problems and facts—the equation and the identity. Drills in translating the conditions given in the problems

into equations are very important. To do this successfully is the acme for developing thought power. The student should be made equally familiar with the meaning of the equations and the formulas because of their use in other fields. Without it, he would find himself handicapped.

Take a proposition in Geometry. Give the class an opportunity to learn and study the things about the problem . Let them underline the hypothesis, the conclusion, list the conditions given, see what is required and what is to be done; make some application. They will begin to make inferences. This drill or work will create a certain analytic type of way of thinking. They are learning how to size up things. The exactness and correctness will. of course, in a measure depend upon the scope and character of training and experience.

Again, not only does oral work, but mathematics in general, furnish material for individual participation. The student is not bound by a text or an author. He may cultivate individual initiative and originality. He can make it his own. He can check both the problem and his own line of procedure. While doing this, he is gaining experience and cultivating his mentality. Such training would tend to eliminate any tendency towards vagueness and loose generalization.

Class room work in Geometry may be made very effective if each member understands the subject matter and the method of attack and if he is given a responsibility. Assign a part of the class at the blackboard. Hold the others, as critics, responsible for the accuracy of the work of those at the board. The entire class is assigned and engaged in some specific and definite thing to do. No credit is given the critic unless he is able to check the work. This criticism, if well guided, inspires in the pupil a confidence and gives him a standard for measuring his own ability and efficiency. Among the things taken into consideration are the nature and correctness of the drawing, the correct statement of the theorem. the marking of the hypothesis and conclusion, the steps of the proof, and the final conclusion. Mistakes are merely checked, and the student doing the work is given the opportunity to correct his own error. If he cannot, the critic will proceed to prove the proposition. Every one has in this way a responsibility, something to do. This will develop ability and create interest. The details taken into consideration depend on the abilty of the class.

In advanced classes, drawings and mere auxiliary lines are used. Less attention is given to detail work on the board, while more oral and extemporaneous work is done in the class. Allow the class freedom of action in the recitation and in a definite direction. The books are ordinarily closed. Different letters are used than in the book. thus assuring the familiarity of the student with the principle itself, the method, rather than the form in the text, usually a product of rote work. This method is practical and feasible in a class of twenty to twenty-five students. It is effective because it fosters independent thinking and judging. Every student is actively engaged in assigned tasks. He is judging the correctness of his own work as well as that

of the others. Being held equally responsible for definite assignments, ready thinking, and concentrated thinking must function. Each one is lead to make application of what he knows or has learned, in a connected way. The fact that books are closed and different letters are used makes the test mutual.

We must emphasize the drawings, the graphic work, because we recognize the extensive use made of graphical representation. It is said that the most direct way to the mind is through the eye. Therefore the solution is more readily grasped if the drawings are exact. Drawings lead one to make mental pictures. Ability to make mental images develops our creative imagination and space conception. Most people think best when they see what they are thinking about. The idea of functional values is most easily understood by means of a graphic representation. Thus mathematics learned in this fashion would both develop our creative imagination and aid in clear understanding.

Assign a problem in mathematics. Read it carefully. Make a survey of what is given and what is required. Test the student by having him tell what is known and what is sought. His ability to draw inferences from the conditions given, to make a fair estimate of the results, and to choose a method for solving it is a further test of his understanding. To do this means a growth and a development of mental faculties.

How may we emphasize this bigger way of doing things? Use a portion of the class period for laboratory work. The instructor and the class work together preparing for the next day's assignment. The amount of time used will depend upon the individuals of the class, the school, and the length of the period. I am confident that we might profitably spend more time in this fashion in our freshman and sophomore classes in mathematics than we are now doing. The student would be working under careful guidance and led to find himself. It does away with the blind and haphazard method that characterizes so much of the work of the underclassmen in the high schools. They are led to understand not only the problem, but the principle. The number of problems solved in the laboratory period, and actually worked, means more to the average class than appears at first. It offers an equal chance both to the fast and the slow student not possible in a cut and dried assignment. I believe in shorter assignments and more of this work. Students who have not fully mastered the work must pay the price—the loss of time, and wasted energy.

Psychologists have found that it requires a higher degree of thought to think quantitatively, recognizing the process as relatively more complex and necessitating a greater intensity of mental action. It thus becomes necessary that our methods should emphasize a thorough and accurate knowledge of the subject which is not possible when the student is working blindly. In Arithmetic and Geometry, field work can be done. Measurements should be applied to actual problems such as surveying, produce, and concrete material. The physical activities paralleling the mental operations help to

clinch the mental conception. It gives a guarantee to mental imaging as well as a sense of the correctness. Our students would no longer entertain the erroneous notions as to the value and size of an acre of land, a cord of wood, and other units. It is only when the student has the right idea of these units that he can begin to make estimates that approximate the answer.

Again, the countless occasions for using and applying facts previously learned and constant repetition give an added momentum to our mathematical thinking and understanding. We need a certain amount of mathematical information which we may use automatically. Tomorrow's progress depends upon it. It is therefore desirable that certain facts be fixed definitely and accurately in mind. Each step must be specific and to the point Progress can not countenance any vagueness or loose generalization which so frequently prevails in work done by the student outside the classroom.

We are all familiar with the kind of problems found in many of our high school text-books. Suppose the subject matter could be a little closer allied to actual conditions. By a systematic effort material could be selected that would identify the student with things as they are actually done. What would happen? In working the problems, he would make use of all reference books and tables, as an up-to-date banker, mechanic, or engineer would do. This would do away with the idea of working the problems under classified cases, merely following the rules set down in the book. The student would master the principle. He would become familiar with tables and their use in a practical way. The point is this: in a problem in interest, building, or commerce, the subject will function during the process of learning to the degree that the material used, the method of instruction, the solution and the application have been identified with actual usage in the shop, store, office, or engineering field. Allow me to ilustrate what I mean, because it is a fundamental principle. To me it is the key note in our teaching of mathematics and should be our aim and purpose. The making of change in business is done on the principle of addition, not subtraction.

Mathematics affords a training in exactness as perhaps no other subject does. There is a certain precision in a mathematical process which seems to sharpen the thinking power. The student has been held to something definite and specific. This subject offers little or no chance for simply having something to say, because it can not be appreciated or interpreted at many angles. Chaotic thinking is minimized.

A study of the grades of high school students, although covering only two or three years—far too short a period—proves interesting when we find that those ranking high in other subjects have equally high grades in mathematics. Again, the teachers seem to be of the opinion that these students are also more specific in their work.

I recently heard a noted gentleman say that the world needs thinkers, men and women who have learned how to think and how to work. I believe that the type of thought characteristic of mathematical thinking, the

logic, the exactness, and the function of checking, foster independent thinking, strengthen the judgment, and create a desire to know the why and how of things. The entire process has paralleled that of the race—developing from the simple to the complex. It has added something to the student's intellectual and cultural life.

LOSS OF EFFICIENCY IN THE RECITATION.

SUPERINTENDENT L. L. FORSYTHE, IONIA.

A few days ago I came across the following statement in one of our state papers: "Recent tests submitted to the Society of Automobile Engineers by Professor Fishleigh and Mr. Leigh of the University of Michigan show more surprising results (as to the efficiency of the gasoline engine) than had been anticipated. Ninety per cent of the heat value of gasoline is wasted. Forty per cent is absorbed by the water cooling system, 25 per cent by the air enveloping the engine, 25 per cent more in the exhaust gases, leaving 10 per cent brake horse-power delivered where it will do the most good."

This inquiry with its startling disclosure of lost efficiency in a mechanical device that is regarded by the unthinking mass as almost the acme of perfection is illustrative of the general tendency everywhere and in every department of human activity to inquire into the return secured for energy expended. This tendency has been evident during these recent years quite as much in educational circles as elsewhere. But in this field as in so many lines of human enterprise, the conditions entering into any particular investigation are generally so complex, so incapable of measurement, that the expert has scarcely ever been sure of his findings. To be sure some splendid results have been obtained—results that will stand the test of time and greatly modify school-room procedure for all time to come. But these have been chiefly in the field of elementary education, although the activity in secondary school circles at the present time promises quite as important results.

The term efficiency has come to be so closely associated with inquiries such as I have just referred to that I fear some may anticipate that I am to bring to you a report of some elaborate experiment or investigation with tables of confusing statistics, bewildering calculations and learned references to medians, curves of distribution, coefficients of correlation, etc., etc. But such is not my purpose. I might be proud to be able to do that; indeed I think I would; but having no such data to present, I must content myself with an old-fashioned expression of certain judgments based on some years

of experience as a teacher and supervisor of teaching. I am not one of those who thinks that because we have adopted in the word efficiency a new term, we have any great advantage over the old-time teacher who sought to improve his methods and the results of his instruction by introspection, retrospection, circumspection and by response to official inspection. The procedure which I shall follow therefore will be to enumerate some of the indictments for inefficiency which have been brought against our high school instruction and then inquire into some of the chief causes of this condition, which all of us admit is far from satisfactory.

I wish to cite the testimony of three men with reference to this matter of inefficient instruction. The first is a well-known educational authority in this state. His statements are derived from the observation of hundreds of high school recitations. Recently in a conversation with me he remarked impatiently and at length on the prevalence of purposeless, floundering, fill-the-time methods of conducting classes. Another man whose opinion is highly regarded in educational circles all over the state said to me only recently: "I know of no place where so much time is wasted as in the recitation, unless it be in the laboratory"; and again: "The inefficiency of teaching in the high school is surpassed only by the inefficiency of teaching in the grades." Yet neither of these men is specially out of sympathy with our present-day system of schools. Each was merely voicing his conviction that we have as yet come far short of the best of which we are capable. There is, however, a deep-rooted dissatisfaction in certain quarters with pretty much the whole fabric of the modern educational system. I know of no recent indictment more severe or more iconoclastic in its suggestions than that by Dr. Abraham Flexner in his pamphlet published by the General Education Board under the title, "A Modern School." Dr. Flexner undertakes to show by figures "the extent to which our current teaching fails." He uses for this purpose the reports of the College Entrance Board in 1915, assuming that his contention is strengthened by the considerations that only the better students from our high schools seek to go on to college and that of these many receive special drill for the examinations. His statement is that "In 1915, 76.6 per cent of the candidates failed to make even a mark of 60 per cent in Cicero; 75 per cent failed to make a mark of 60 per cent in the first six books of Virgil, every line of which they had presumably read and reread; 69.7 per cent of those examined in algebra from quadratics on failed to make as much as 60 per cent; 42.4 per cent failed to make 60 per cent in plane geometry."

"It is therefore useless," he observes, "to inquire whether a knowledge of Latin or mathematics is valuable, because pupils do not get it; and it is equally beside the mark to ask whether the effort to obtain this knowledge is a valuable discipline, since failure is so widespread that the only habits acquired through failing to learn Latin or algebra are habits of slipshop work, guessing and of mechanical application of formulæ, not themselves understood."

Now it is not my purpose to try to determine to what extent these conclusions are justified. I am merely going to assume that they are not made without considerable justification in fact at the least—to recognize just as the automobile expert does in his line that there is a high per cent of waste in the matter of instruction. Where this wastage comes and how it may be remedied to some extent constitute the real problems of our discussion. They are chronic problems and I am fully conscious that I can do little to suggest adequate solutions.

The work of teaching is divided roughly into two sorts of activity — administrative and instructional. The first aims to provide the conditions necessary for the effective pursuit of the latter, which in its best form is the ultimate end of schools. Just as the mechanism of the automobile engine provides the means whereby the energy stored in the gasoline may be utilized for useful work, so the machinery of school organization is calculated to provide those conditions which will enable the instructor and his pupils to get the highest per cent of result from their expenditure of time and energy. Here is where the work of the superintendent or principal counts for most. I am convinced that too often this fact is lost from sight. My observation has been that efficient classroom work is seldom possible with the mass of students, when the general discipline is loose and the ideals low. Two things must be insisted upon as fundamental: students must be required to act as befits young women and young men of culture and refinement and they must be brought to cherish high ideals of scholarship. Such practices as loud talking in the halls, horse-play, loitering, etc., must be eliminated; and the spirit which would put athletics, social affairs or anything else above scholarship must be rooted out and supplanted by an acceptance by the student mass of right things in their right places. Both of these matters are all-pervading in their influence. Improper practices in the halls and elsewhere about the building or the general acceptance of easy-going standards of work overflow into every classroom and sap the effectiveness of every recitation in any school where such conditions prevail. The most skillful class-room instruction cannot redeem a school which is negligent of these fundamental considerations.

Another condition making for inefficiency whose remedy is perhaps an administrative problem is the grouping together in the same class of pupils of widely varying ability, resulting either from differences in mentality or in preparation. We have undertaken to meet this problem at Ionia during the present year for the subject of beginning algebra in a way that is new to us. Early in the school year it was apparent that about twelve pupils out of our three sections of beginning algebra (numbering about sixty) were destined to complete failure and probably consequent discouragement and elimination from school unless something could be done to save them. Accordingly we reorganized our classes, placing these twelve in a section by themselves and dividing the remaining forty-eight into two sections of twenty-four each. At the end of the semester, five others who were weak when the first division

was made but who had been given a chance to "make good" if they could were sent back into the poorest division. I took charge of the weak section, with some misgivings, I confess, amid expressions of commiseration on the part of the high school teachers, who thought it would be a terrible experience to teach such a class. I tried not to deceive myself as to our problem and I asumed the same attitude in dealing with them. I told them frankly that they had made a poor start, that it was probably due to poor preparation and perhaps to some extent to their own lack of effort, and that our plan would be to thoroughly review the important things that had been already covered and then to go forward as rapidly as possible. Almost to the last one they responded heartily and have made splendid progress. One or two have not done well because they are constitutionally lazy. On the other hand the development of several members of the class has been a reward in itself for all the effort I have expended. In twelve years of teaching experience I have not taught a class which has yielded me so much satisfaction. These students will require about a year and a half to complete a year's work. They have been saved from the discouragement of failure and of loss of credit for a semester's work. On the other hand the two sections that have been relieved of this incubus have been able to make better progress and maintain a higher standard. I am convinced that the plan is a good one, though I am aware that not all who have tried a similar scheme have arrived at the same conclusion. Where this arrangement is not followed, a problem is presented to the instructor which is quite impossible of satisfactory solution. Usually we find many minutes of each recitation period devoted to individual work with backward students while the others sit by justly bored and either idle or engaged in some devilment. The ingenious teacher will find devices, more or less successful, for meeting this situation, but too often the problem is pretty much disregarded and with wasteful results.

But given a good school spirit and proper organization, there is still a vast amount of inefficient teaching. One of the most fruitful causes of this lies in lack of definiteness in plans. The refrain of the once popular song, "I don't know where I'm going, but I'm on my way," is fairly descriptive of the situation in which a majority of our teachers find themselves. And it follows as a matter of course that their students are quite as much at sea. I firmly believe that not one teacher in ten on the average has seriously questioned his own motives in teaching any given course. How seldom do teachers ask these fundamental questions: What worth-while results are to come to my students from the year's work in this subject? What available material will best accomplish these results? In the use of this material what parts should be given only passing attention, what parts should be thoroughly studied and what parts should be definitely and completely learned? What devices will most economically accomplish the desired result with relation to the various parts of the subject matter? The instructor who has neglected to answer these questions has already invited failure, waste and inefficiency; the teacher who has demanded for himself the answers to these inquiries has

assured himself an eminent success. From the first day his students will catch the ring of sincerity in his voice and respond to the suggestion of purpose in his every word and action. There will be no uncertainty in his questions, no aimless wanderings into attractive but unprofitable by-paths, no expenditure of valuable time on non-essentials, no compromise in demanding the mastery of fundamentals, no uncertain assignment of lessons; in short he will sail no devious course; his port will always be in mind; his bearings will be known each day. It is not necessary that he shall have settled all the problems that are troubling our leaders in educational matters. Give him any subject-matter from Sanskrit to forging, he will develop mentality and character, *i. e.*, manhood and womanhood; and this is true education. For here the by-product is more important than the main out-put. It is not so much what body of facts and truths we study; of far more importance are the habits of thought, capacity for work, and sincerity of purpose developed by struggling with these facts and truths. And the teacher of any subject who comes to his task with a lofty purpose in results to be obtained, with a thorough acquaintance with the field to be studied and a keen comprehension of the most economical means of making the connection between student and subject-matter, combined with the skill to convert this knowledge into practice, will be saved unequivocally from most of the pernicious weaknesses which sap the effectiveness of the customary recitation.

I have said that subject-matter is secondary in importance when handled by a masterful teacher. I would not be taken to mean, however, that I think that all subjects or all parts of the same subject are of equal importance. Undoubtedly curricula and teachers have offended grievously on this score. Such an assumption is an insult to the instincts and intelligence of our children and a serious lapse of ordinary good sense on our part. Putting the same emphasis on the table of troy weight as on the table of linear measure or the same length of time on the organization of the Roman Republic in the time of Cicero as on the organization of the present-day British Empire are offenses from which our class-rooms are by no means free today. Such conditions show a sorry failure to appreciate the most significant tendency in educational thought in these latter days—namely, the growing realization that for the student the life which he is now living is just as significant as the experiences which will come to him in later years. That he should be compelled to devote himself to matters which seem to have no vital significance for him now or at any future day results in lack of interest, and where such a condition exists the teacher's task is similar to the experience of lifting a limp body which gives no assistance to the operation. I am confident that we have thus far seen only the beginning of the process of clearing our courses , our texts, and our recitations of the immense amount of material which has no meaning or value for the child at the time it is taught. I do not think that this movement will result in the complete rejection of the greater part of the subjects and matter now taught, but it is my thought that these will find places in the scheme where their significance

will be evident. Every subject as now taught will be subjected to searching scrutiny and gruelling criticism. Not least among the subjects to be thus arraigned will be algebra and geometry. The process is already well along. The modifications in the treatment of these subjects will be along lines which will make them or what may remain of them of more evident value to the student, and to just that extent, other things being equal, will the efficiency of recitations in these subjects be increased. Under the new order of things the point will be removed from such observations as the following from G. Stanley Hall: "At least three-fourths of the time spent by a boy of twelve in trying to learn a hard lesson out of a book is time thrown away."

I now come to what I regard as the prime cause of lost efficiency in the recitation—viz., inadequate preparation of the lesson on the part of the student. If one takes careful note of the evidence of aimless, wasteful, unintelligent effort put on work assigned from day to day, the situation becomes positively alarming. If he further notes the fact that to the majority of teachers this appeals as a problem quite beyond their control except as it may be met by scolding and fault finding, it becomes doubly so. However, even with the customary organization of work there are many ways in which the efficient teacher may establish a control over study. Careful planning of whole courses and of daily work, the devising of means of checking up effectively and economically the work of every student each day, the enlivening of the subject by relating it to vital problems, the reduction of formality and restraint and the development of a social feeling in the recitation may be mentioned as means of securing these ends. But I have no doubt that the most promising method of securing the desired result and inculcating proper habits of study lies in the plan known as supervised study. The distractions of these modern days coupled with the consideration that most of our young people have no suitable place for home study seems to make such a scheme a prerequisite for successful work by a majority of our high school students. At any rate some adequate solution of this great problem is fundamental to efficient work in any school.

By way of conclusion permit me to recapitulate. The teaching process as it obtains in our high schools is wasteful in the extreme. The remedy lies either with the administration of the system or with the class-room instructor or both. From the administrator must come (of course with the help of all teachers) a general discipline which eliminates distractions, an *"esprit de corps"* which popularizes good work, and a plan of organization which will permit the best and most economical results to follow from our group system of instruction; from the class-room instructor must come the most careful planning of ends to be accomplished and the most efficient adaptation of means to ends, the enlivening touch which links up subject-matter with real life, and a definite, effective control over study. With these ideals realized the occasion for criticism of the inefficiency of our high schools will be largely removed.

BIOLOGICAL CONFERENCE

GENERAL SCIENCE IN MICHIGAN.

MR. ADRIAN A. WORUN, SAULT STE. MARIE, MICHIGAN.

The subject of General Science has been discussed throughout the country for the past five or six years. Its aims, advantages, place in the curriculum, content and method has been the subject of articles in educational magazines; committe reports have been published on it and science conferences have considered it from all angles. Surveys have been made of General Science in other states, and this report is made so that the status of General Science in Michigan may be known.

The data which is the basis of this report was received from answers to a questionnaire which was sent to the high school science instructors in the schools on the 1916 accredited list of the University of Michigan. Accredited schools were chosen because they, it is assumed, are representative of Michigan schools; and furthermore, they are the schools that are interested in University recognition for General Science. As the questionnaires were answered in the fall of 1916, this report deals with the conditions of General Science for the first semester of the school year 1916-1917. One hundred and seventy-two of the two hundred and eighty-three schools on the list replied.

When answering the question, "Is a Course in Elementary or General Science Offered?" instructors were asked to distinguish between Elementary and General Science according to the distinction made by Prof. E. D. Huntington of the Western Normal of Michigan as given in his Discussion of the Report on the Elementary Science Situation in Michigan, printed in the Journal of the Michigan Schoolmasters' Club, 1916:

"The essential difference between Elementary and General Science is that the former would present the elements of certain specialized sciences to the child from the standpoint of the sciences, while General Science would select facts and principles from the whole field of Science according to the needs of the ninth grade child and endeavor to present this subject matter to the child by such methods as will arouse and hold his interest."

In case neither such course was offered, the question was to be answered —neither. Below are the answers to the question quoted above together with the data received from the question, "If no General Science course was at present offered, is it your plan to do so soon?"

Having elementary science	7 replies
Having general science	69 replies
Having neither	96 replies
Planning to offer it soon..............	36 replies

The distribution of schools according to high school enrollment furnishing the above data is given below:

ENROLLMENT	ELEMENTARY	GENERAL	SOON	NEITHER
Under 100	2	14	10	40
100-200	4	30	18	32
200-300	1	13	4	8
300-400	..	4	2	7
400-500	..	2	1	4
500-600	..	1	..	..
600-700	..	2	..	..
700-800	..	..	1	1
800-900	..	..	..	..
900-1,000	..	..	..	1
Over 1,000	..	3	..	3

In order to facilitate discussion, Elementary Science will be considered under the head of General Science during the remainder of this report.

Our data shows that:

I. At least 27% of the 283 accredited schools offer General Science.

II. At least 22% of the entire number of high schools in Michigan, 345 in number, offer General Science.

III. One-half of the schools offering General Science are in the North Central Association of Colleges and Secondary Schools.

IV. Assuming that the schools answering "soon" carry out their plans, in the near future, 112 or at least 39% of the accredited schools will soon be offering the course. Three schools are offering the course for the first time during the second semester of the year 1916-1917.

Two instructors volunteered the information that they were offering no such course "because the University does not recognize it." Five schools report that "we will offer it as soon as it is recognized."

The data from the questions, 'In what grade is General Science offered?" and "What is the length in years?" is tabulated below:

GRADE	LENGTH OF COURSE	OCCURRENCE
9	1 year	40 times
9	½ year	6 times
9—10	1 year	3 times
9—10	½ year	1 time
9—12	1 year	2 times
10	1 year	3 times
8—9	1 year	3 times
8—9	½ year	1 time
8	1 year	9 times
8	½ year	1 time
7—8	2 years	4 times
7—8—9	3 years	3 times

The above table shows that, as regards to position in the curriculum:

21 courses are below the ninth grade.
59 courses are in the ninth grade.
9 courses are above the ninth grade.

Where the course is in the high school:

51 are 1 year courses.
8 are ½ year courses.

Where the course is below the high school:

15 are 1 year courses.
2 are ½ year courses.
4 are 2 year courses.
3 are 3 year courses.

In the above three tables, the courses that were offered both in the ninth grade and below were treated as separated courses, as were those appearing both in the ninth grade and above. This explains the discrepancy of more schools answering the question quoted above than the number, 76, that actually have the course.

Two schools, Scottville and Munising, (enrollments 175 and 125, respectively,) reported themselves as being on the 6—6 plan (six years elementary school and six years high school). The Scottville course in General Science is arranged thus:

Grade 7—elective, reciting 2 forty-five minute periods per week.
Grade 8—elective, reciting 4 forty-five minute periods per week.
Munising reports:
Grade 8—compulsory, reciting 5 forty-five minute periods per week.

Kalamazoo reports 6 schools offering General Science, 3 of these have a Junior High School of 7, 8, and 9th grades and offering it in each grade. In these schools, the course is distributed thus:

Grade 7—required, reciting 2 forty-five minute periods per week.
Grade 8—elective, reciting 4 forty?five minute periods per week.
Grade 9—elective, reciting 5 forty-five minute periods per week.

In the other three schools, the course is distributed as in the 7th and 8th grades above.

Muskegon, (enrollment 1,250,) reports one 5 year high school. General Science is offered in the 8th grade and is continued as Organic Physiology in the 9th, being compulsory in both grades.

Grand Rapids Central High School, (enrollment 1,200,) reports an elective course offered in 8*b* and 9*a* and continued in 9*b* as Physiology, the course being one or three semesters in length.

The answers to the question, "What other sciences are taught in the school, and in what years?" taken from the schools that answered as having General Science, are tabulated below. Only high school subjects are considered.

SCIENCE	9	10	11	12	TOTAL
General Science	57	9	2	2	70
Botany	18	32	1	..	51
Physiography	4	14	2	1	21
Zoology	1	13	1	..	15
Biology	5	11	1	1	18
Agriculture	2	8	13	7	30
Physiology	2	8	..	..	10
Physical Geography	3	4	1	..	8
Horticulture	..	1	1	1	3
Greenhouse and Garden Practice	..	1	1	1	3
Geology	..	..	1	..	1
Chemistry	..	..	54	17	71
Physics	..	..	17	54	71
Hygiene	..	..	..	2	2
No Course	..	5	1	..	6

In addition to the 70 courses of High School General Science, there are 2 in the seventh grade and 17 in the eighth grade.

The table should be read: General Science is given in the ninth grade in 57 schools, in the 10th grade in 9, etc. Similarly for other subjects. Many schools offer the same course during different years; such is the case with Horticulture and Greenhouse and Garden Practice; two schools offer Agriculture in each of the high school years. Five offer it for three years and three for two years. The largest number of science courses offered in one year in any school is four. General Science is the dominant subject in the ninth grade; Botany in the tenth grade; Chemistry in the eleventh grade; Physics in the twelfth grade. There are as many twelfth grade Chemistry courses as there are eleventh grade Physics courses. The poor showing of Physiography is due to the fact that it is superseded 28 times by General Science. We notice that General Science ranks third in the high school science curriculum; it is offered 1/5 as many times as all the sciences in the High School, and that it occurs twice as many times in the 9th grade as any other science.

The aims and purposes for the course "that have been formulated in order to justify it to school constituencies and pupils," are divided as follows: The number following denote the number of times it was mentioned —some instructors having more than one aim for the course.

I. General Science lays the foundation for future science courses—47.

Stimulates interest in sciense	15
Enables pupils to choose intelligently science courses in the future	8
Embraces all science	1
Teaches diction of science	1
Introduces scientific methods	6

Good introductory course to specialized science...... 11
Shows interrelation between sciences 1
Removes dread of later sciences 1

II. General Science explains the pupils' environment—31.
Pupils can understand interests in town that depend on science 4
It gives an understanding of everyday phenomena.... 10
Student can appreciate the beauties of nature........ 1
Teaches everyday life 10
Student will find that he can discover things for himself 1
It is more practical than Physiography 1
Gives general information—is cultural 3
Pupils will be able to understand scientific papers..... 1

III. Those people who do not elect the specialized science courses later or who drop out of high school will nevertheless have some science—19.

IV. Unclassified aims—4.
It is so important that it should have a place......... 1
The work is interesting 1
It discovers whether student leans to science or not... 1
Keeps people in school 1

The dominant aims, then, of General Science are to prepare for the specialized courses, and to explain environment, utilitarian, both of them. Many instructors made much of the third aim, one reporting that it convinced the School Board in his city.

The Answers received to the question, "What are the advantages of a course in General Science?" show that advantages are along the same lines as the aims and purposes. One instructor replied, "The advantages are too numerous to mention." While another enthusiastically declared, that there was not room on the paper to put them all down. Still another reports that General Science is such a good foundation for later courses that there may have to be two sections in the later courses, one for the students who have had General Science and another for those who have not had it. The advantages are classified below:

I. It is a foundation for later courses—30.
Stimulates an interest in science 12
Gives general knowledge in science 1
Prepares people to choose science later............. 8
Correlates science 2
Introduces scientific methods 2
Makes ground work for other science 1
Introduces a scientific attitude of mind 1
It makes a quick get-away in physics and chemistry... 1

It gives more advancement in higher courses	1
It dispels the haze that attends the beginning of advanced courses	1
II. It explains environment—10.	
It explains everyday life	9
Students who take it get an appreciation of nature	1
III. Unclassified advantages—9.	
It covers all the sciences at any time	1
It has big teaching values—social, intellectual, etc.	1
Most people have an interest in science at that age	1
It humanizes the curriculum	1
It teaches how to study	2
The course is popular	1
It keeps people in school	2

The fact stands out, that the great advantage of General Science for the student is that it makes future science easy to him. But we cannot judge from the figures that he is prepared for future science twice as much as his environment is explained to him, for explanation of environment and preparation for future courses undoubtedly go hand in hand in most intsances.

Any course which is new in a curriculum naturally has some disadvantages. Below are the limitations of General Science.

I. Content—28.	
Scattered information—no sequence	1
Cannot be thorough in any one subject	11
Too general for specific knowledge	5
May lead pupils to think that future courses are as easy	1
May be so hard as to kill interest in future courses	1
May be bookish	1
May go beyond the pupils' experience	1
Will be repetition of topics for those who go on	1
May take away interest for science later on	2
May be made too difficult	1
There is little of intrinsic worth in the course	1
Hard to select topics on which to lay emphasis	1
Supersedes Physiology	1
II. Lack of facilities—11.	
Poor texts	1
Lack of laboratory facilities	9
Lack of properly prepared teachers	1
III. Administrative—5.	
Curriculum too crowded	1
People too young	1
Students neglect other work to read up on science	2
Sections too large	1

The dissatisfaction expressed under the heading "Content" is well summarized by one teacher: Too many bites and not enough chewing. That depends on our aim—Are we trying to teach the pupil some of each phase of science or are we giving to the pupil an understanding, adequate to his needs, of such phases of science as affect his every-day life. Lack of facilities in many schools might as well refer to the other sciences also. But the disadvantages under the last two heads will disappear when General Science is firmly established and the content of General Science will be adjusted as specific aims are followed.

A state of affairs which is not only true for other subjects as well as for General Science, particularly in small schools, is brought to light by the answer to the question, "What other subjects are taught by the General Science instructor?" We find that, of the 65 General Science teachers who replied,

2 General Science teachers teach no other subject.
15 teach one other subject.
24 teach two other subjects.
13 teach three other subjects.
11 teach four other subjects.

The following table shows what subjects besides General Science, 65 teachers handle.

No other subjects	2
Mathematics	1
Mathematics and Athletics	1
Commercial	2
Other sciences	29

Other sciences plus one of the following:

Mathematics	9
Athletics	1
Commercial	2
Latin	2
Public Speaking	1
English	2
Literature	2
Economics	2
History	1

Some of the bizarre combinations are due, no doubt, to the limitations of the school program; but many of them seem hard to justify on any grounds. Efficiency in the teaching of science, general or special, or any other subject will be increased as such combinations disappear.

Altho General Science courses are general in name, sometimes certain phases predominate. One school reversing the procedure reports that their

General Science course is scheduled as Agriculture. The replies obtained from the question, "Does the course refer chiefly to physical, biological or physiographical topics" are shown below:

PHASE PREDOMINATING	IN HIGH SCHOOL TIMES	BELOW HIGH SCHOOL TIMES
No particular phase	30	4
Physiography	9	..
Physics	8	1
Physical Geography	..	1
Agriculture	1	..
Physiography and Physics	8	..
Physiography and Agriculture	1	..
Physiography and Biology	4	..
Physics and Physiology	1	..
Physics, Physiology, Chem.	1	1

Another compilation of the above data shows:

PHASE PREDOMINATING	TIMES MENTIONED
Physics	19
Physiography	22
Biology	4
Chemistry	1
Agriculture	2
Physiology	2
Physical Geography	1

One of the administrative problems that must be met when a new subject is introduced in the curriculum is "Shall the course supersede another, or shall it be a distinct addition?" The following table shows how seventy schools answered the question, "What subject, or subjects, did General Science supersede?"

SUPERSEDED SUBJECT	IN HIGH SCHOOL TIMES	BELOW HIGH SCHOOL TIMES
Nothing superseded	19	8
Physiography	28	2
Physical Geography	5	..
Geography	..	1
Botany	2	..
Biology	1	..
Agriculture	1	..
Physiography and Botany	2	..
Biology and Physiology	1	..

Considering the subjects separately, we find the following:

SUBJECTS SUPERSEDED	TIMES MENTIONED
Physiography	33
Physical Geography	5
Geography	1
Botany	5
Biology	1
Agriculture	1

We find that, in most cases, sciences that are superseded are not lost entirely in the curriculum as is shown in the following table in which only ninth grade subjects are considered.

SUBJECT	TIMES EMPHASIZED	TIMES SUPERSEDED
Physiography	22	33
Biology	4	1
Agriculture	2	1
Pysiology	2	1
Physical Geography	1	5
Geography	..	1
Botany	..	5

Seventy-four instructors report the following texts:

Snyder—First Year of Science	24
Hessler—First Year Science	13
Caldwell and Eikenberry—General Science	13
Clarks—Introduction to Science	11
Pease—A First Year Course in Science	9
Weckel and Thalman—A Year in Science	1
Mayne and Hatch—Agriculture	1
No text used	2

The wide difference of General Science text-book writers on the content of the General Science course is shown in the following table, which is a revision of Table Table I, "Number of pages in General Science Texts given to the different special sciences," as given in "General Science in Iowa High Schools" by E. E. Lewis, School Review, June, 1916.

	HESSLER	CLARK	SNYDER	CALDWELL	PEASE	WECKEL AND THALMAN
Physics	150	249	67	76	74	51
Chemistry	88	56	10	12	22	59
Biology, (Zoology, Botany, Physiology)	178	26	82	131	48	230
Agriculture	10	..	15	15	2	7
Geology	14	..	198	19	83	20
Meteorology	26	..	41	39	12	29
Astronomy	..	..	30	3	31	..
Commercial Geography	..	..	..	8	..	..

Mr. Lewis reported difficulty in distributing material appearing in the texts, and that therefore the above table does not accurately show the portions of the book spent on each specialized science. It is, however, sufficient for a rough comparison. We find that, considering all the texts together, they emphasize the phases of science in the order in which they are emphasized in the General Science courses in the state, Physiography first, Physics second, etc.

Due to an unfortunate oversight while the questionnaire was prepared, no data are available to show what percentage of the whole number of pupils in the grade elect General Science; we can, however, discover how interested the pupils are who do elect the course. In the answer to the question, "How do pupils show an interest outside the class room?" we find the following manifestations of interest and the number of times mentioned.

Perform experiments at home and after school	23
Request information and explanation	5
Cite observations of phenomena	12
Interest in apparatus (wireless, engines, dynamos, manufacturing plants)	6
Bring specimens to school for identification (and apparatus)	9
Conversation outside of school	6
Bring clippings from papers	5
Outside reading (including systematic reading of scientific magazines)	7
Asking questions	13
Pride in note books	1
Applying principles to phenomena	10
Suggesting problems and explanations	3
Formation of science club	1
Use science subjects in English composition	1
Students now question what they once took for granted	1
One instructor declares that "there is not enough room on the paper to mention them all."	

The above list also shows that the student is really interested in class as well as out of it. From their point of view, they are consciously getting an explanation of their environment. What better reasons for being interested are there than the fact that the principles studied explain things and intimate experiences—building fires, removing stains, keeping afloat in water, how a dynamo runs, etc. Anyone who has taught General Science has experienced the joy of seeing pupils really enthusiastic and such enthusiasm, properly guided, can be made to realize any aim that can be formulated.

The following table is compiled from data received in answer to the question, "In what phase are the boys most interested? the girls?" The numbers given refer to the frequency with which the phases were mentioned.

PHASE	BOYS	GIRLS
Machines	1	..
Physics	9	2
Chemistry	7	3
Manual Training	1	..
Mechanics	1	..
Electricity	6	..
Practical	2	..
Practical Experiments	4	..
Showy Experiments	..	1
Astronomy	1	1
Botany	..	7
Zoology	..	2
Physical Geography	..	2
Domestic Science	..	10

These figures are not to be interpreted thus: The boys are interested in machines in only one school; rather in this fashion—in one school boys are predominantly interested in machines, being interested in other things also. Similarly for other figures. The table shows that the interest of the boys are along the lines that deal with the world in which they are living—the world of industry. The girls, as is somewhat to be expected, are interested in the practical affairs of the home; they also find interest in Botany, Zoology, and Physical Geography—subjects which do not appeal to boys so much probably because the practical side of these sciences is not so apparent.

Answers to the question, "Is the course elective or compulsory?" show the following data.

In the High School, 3/4 of the courses are elective and 1/4 compulsory.

Below the High School, 1/3 of the courses are elective and 2/3 compulsory.

The majority of courses in the high school are elective; the majority below the high school are compulsory.

The following table shows what percentage of students who elect General Science are boys and girls.

PCT. OF BOYS	PCT. OF GIRLS	TIMES REPORTED
50	50	9
55	45	4
80	20	5
70	30	4
60	40	11
90	10	2
40	60	7
45	55	4

We find that, on the average, the large percentage of students are boys. If we average the percentages and consider all the individual elective courses combined into a large class, we find

Boys	61.4%
Girls	38.6%

The size of sections in General Science do not vary very much from the size in other courses. Here are the data.

NUMBER IN CLASS	IN HIGH SCHOOL	BELOW HIGH SCHOOL
Below 10	1	..
10-14 inclusive	2	..
15-19 inclusive	11	..
20-24 inclusive	15	5
25-30 inclusive	18	12
31-34 inclusive	4	2
35-39 inclusive	2	..
40-50 inclusive	..	1

We notice that the sections are, roughly speaking, larger in the high school than below the high school, and that, considering the high school courses only, 33 out of the 53 schools reporting have classes between 20 and 30. The data available show that no general statement can be made about the relationship between the size of compulsory and elective courses.

The number of class meetings (including laboratory meetings) per week is shown in the following table.

NO. MEETINGS	IN HIGH SCHOOL	BELOW HIGH SCHOOL
5	51	11
4	2	..
3	..	2
2	..	1

Length of the recitation period is shown below.

LENGTH	IN HIGH SCHOOL	BELOW HIGH SCHOOL
45 minutes	52	6
40 minutes	4	1
60 minutes	2	1
20 minutes	1	1

The data received in answer to the question, "Is a laboratory used in connection with the course?" show that the following interpretations were made by the word "laboratory."

I. Demonstrations made by the teacher in laboratory.

II. Individual laboratory work by students as is carried on in the specialized sciences.

At any rate if we consider that the answer "yes" means that there is some other work besides the work in class, either as laboratory demonstrations or individual laboratory work, we find that

90% of high school courses have laboratory work.

40% of courses below the high school have laboratory work.

10% of the replies from the high school courses stated that they had class demonstrations; 37% of courses below the high school have the same, so we may conclude that all the ninth grade courses have either laboratory or class demonstrations; 77% of courses below the ninth have the same.

The manner in which the laboratory is conducted is shown below:

	IN HIGH SCHOOL	BELOW HIGH SCHOOL
Laboratory demonstrations by teacher	40%	75%
Individual work by students	15%	10%
Both	35%	15%

The following table shows the nature of the laboratory outlines used:

Pease Laboratory Manual	7 times
Caldwell, Eikenberry, and Pieper	9 times
Hessler	7 times
Mimeographed directions	2 times
None	51 times

Of these, the directions are found in the back of Hessler's text; the other two are separate volumes. In the case of the 51 who have no printed instructions, the experiments are in some cases suggested by the text, by the laboratory manuals, of the specialized sciences or by experiments from different General Science manuals.

Home experiments are performed by students in 80% of the high school courses, and in 66 2/3% of the courses below the ninth grade. Note books are kept in 88% of the courses having laboratory in high school and in 66 2/3% of the cases having laboratory below the high school. The following table shows the length of the laboratory period:

TIME IN MINUTES	IN HIGH SCHOOL	BELOW HIGH SCHOOL
40	3	..
45	31	6
60	3	1
90	1	11
80	1	..

Number of laboratory periods per week:

NUMBER	IN HIGH SCHOOL	BELOW HIGH SCHOOL
1	15	2
2	20	..
3	2	2
0	4	8
Varies	12	2

Below are some examples of how some schools divide the time per week in High School General Science.

HIGH SCHOOL ENROLLMENT	NUMBER OF RECITATIONS	LENGTH OF RECITATIONS	NUMBER OF LABORATORIES	LENGTH OF LABORATORY
133, 335, 70, 270	4	45 min.	1	90 min.
45	3	40 min.	2	80 min.
550	3	45 min.	2	80 min.
400	4	45 min.	1	70 min.
250	4	30 min.	1	60 min.

The following table has been prepared to show the time spent per week on General Science.

MINUTES PER WEEK	IN HIGH SCHOOL	BELOW HIGH SCHOOL
90	..	3
135	..	2
200	5	..
225	40	5
270	6	..
300	3	2
315	3	..
330	1	..

It will be noticed that there are only a few instances of courses that do not meet at least 5 times a week; that in only one case in the length of the period under 40 minutes. As in the high school courses, 51 are 1 year courses and 8 are ½ year courses, it will be seen that the great majority of cases, at least 120 60-minute hours are spent per year in the course, thereby equalling the time spent in the recognized science courses.

General Science is conceded by many to be in an experimental stage. Unlike some other subjects on the High School curriculum that are undergoing changes, it has not yet won recognition by the University of Michigan as a unit for entrance, altho the faculty have been considering it for some time; as it now stands, the University is waiting for recommendation from the Schoolmasters' Club. With a view of ascertaining the opinion of the science men (the people who would be qualified to state one way or the other, as they are making the course) on the matter, the question, "Do you believe the General Science course to be of such a character as to merit recognition as a unit by the University?" was added to the questionnaire.

One hundred thirteen replies were received to the question; of these 73 were from schools having the course, and 39 from schools not having it. The following table shows the results.

	SCHOOLS HAVING COURSE	SCHOOLS NOT HAVING COURSE
Yes	67	23
No	5	15
Undecided	1	2

We notice that the ayes have it by a big majority in schools where the course is found; in schools where it is not found, more than fifty per cent are in favor of giving the course recognition. Combining the two columns we have

In favor of recognition	90
Not in favor of recognition	20
Undecided	3

These numbers show that 88% of those who answered the question are in favor of giving it recognition. A bigger percentage in favor of recognition is shown in the case of schools having the course. In those schools, where we must consider that the advantages and disadvantages of General Science are actually realized, the percentage in favor of recognition is 91%. That only three reported that they were undecided, shows that this question has been rather fully contemplated by those answering. There were many answers that read "emphatically yes," and in other ways showed that the instructors had no doubt about the matter.

The reasons given for thinking that the course should be recognized are as follows:

If the teacher is capable.

Ought to have as much recognition as other science.

Students will take it if the University gives credit.

If the course has a laboratory and is not a hodge-podge.

As course is largely Physiography, and Physiography was recognized, General Science should be recognized.

It has a direct bearing on the observation of normal students.

It is as much an observations, thought and reason developer as any other subject.

The following reasons are given as not being in favor of recognition:

There is not enough unity of aim.

It is not standardized.

Of those undecided, all agree that action should be taken at once, in fact, there is a general opinion throughout the state that "something ought to be done about it soon." Some schools are in this position—altho they consider the course as good as any other, and it is one that they want to recommend to students, yet they hesitate to do so when the students should be taking work for which they will be getting entrance credit at the University. This is particularly true in schools where the curriculum is crowded.

A complete list of Universities and Colleges that recognize General Science as an entrance unit is not available. Practically all of the Western Universities allow an unit of entrance credit for it, as do several of the Southern institutions. A partial list of Universities recognizing it are: Chicago, California, Northwestern, Nebraska, Arkansas, Mississippi, Alabama, Georgia, Kentucky, Ohio, Iowa, Kansas, Texas, Brown, Washington, Oregon, S. Cal-

ifornia, Oklahoma, New Mexico. and James Millikan. Several of the universities accept it from students who come from strong high schools.

General Science is here to stay; and with University recognition, High School Science will take the place in Michigan schools that it merits.

THE VITALISTIC VERSUS THE MECHANISTIC CONCEPTION OF LIFE.

PROFESSOR O. C. GLASER, UNIVERSITY OF MICHIGAN.

The controversy between vitalists and mechanists does not involve matters of fact. Insofar as we really understand vital phenomena—can tell how the trick is done, we invariably find our explanation in terms of physical and chemical forces. These constitute the mechanism of life.

But there is much that we do not understand. In the darker realms—the intellectual underworld, the battle between vitalism and mechanism rages. However, since neither contestant has grasped the events about which he debates, the views built up on this foundation cannot properly be considered legitimate parts of biological science. Science is what we know. Vitalism and mechanism therefore are rather points of view, philosophies even, by the aid of which we attempt to interpret the shadows that fall across our path.

The immediate materials of vitalism are the same as those of mechanism. What then are these materials? Wherein do the interpretations differ? And finally, are the differences inevitable?

Before this audience, it is not necessary to go into detail. The vitalist is peculiarly impressed by the apparent purposefulness with which living things go their ways. For him the mouse does not build a nest *and* keep warm; it builds its nest *to* keep warm. And so in general, the living world purposely performs acts useful to itself in an environment, often harsh and subject to change. He asks therefore whether organic behavior in the aggregate, development, digestion, or any one of a complicated chain of processes in which everything seems to happen at the right time, the right place, and to the proper degree is intelligible unless in some way guided, not necessarily by consciousness, but by some analogue—some vital X.

The mere analysis of the immediate responses to chemicals, sound, heat, light, electricity, mechanical impacts or what not, according to the vitalist by no means exhausts the possibilities. The organism does not, he claims, react to these, but to an entire situation. Stimuli, rightly interpreted are signs with a significance. Their meaning may be projected far into the future. Response is not to one point in time. Rather is it adjusted to the entire temporal series. It is an answer intelligible only in terms of the complete life history. To this whole the organism reacts. Moreover it itself

reacts as a whole. Behavior, in the widest sense is a synthetic product in which a complicated machine, in the light of history, past and to come, makes something, which in its most baffling form we call experience.

In this respect a living thing differs radically from a phonograph. Like the phonograph it reflects individual history in the most specific manner. The record may even discourse learnedly, or, like Kipling's banjo, be the prophet of the utterly absurd. Yet it cannot conduct a conversation—it cannot be insulted. It lacks the power of experience. The agent which would enable it to build from individualized events a full-fledged situation is lacking and hence it does not react as a whole.

In the field in which my own interests chiefly lie, I find this point of view of little help. In my most sober moments I find it hard to believe that a frog is the reaction which a frog's egg makes in its entirety to a situation as a whole, especially when the signal for that situation is the prick of a needle. I find it difficult to understand how an echinoderm egg immersed for three minutes in 50 cc. of sea water + 2.8 cc. of n/10 butyric acid folfowed by twenty minutes in 50 cc. of sea water + 2½ m NaCl solution could spell pluteus. Or for that matter how the stresses and strains to which the developing neutral plate was subjected during the embryonic life of at least one man could be a reaction to a situation in its entirety—especially when this was to demand as its most adequate response that fearsome and wonderful book—The Science and Philosophy of the Organism

The initiation, and for that matter the further conduct of developmental processes seem to me to be intelligible, insofar as they are intelligible, only in terms of physics and chemistry. If I do not understand them in this way, then I do not understand them at all. Experimentally the situation involves nothing which is not present when a gas engine gets under way. A certain equilibrium means standing still—another, movement. What movements are possible depends on the structure of the machine and on the way in which it is harnessed to the world outside.

If we could only study developmental processes without knowing their result in advance! Many difficulties in biology would then be spared. However, since we ourselves are living things, our interest in life exceeds all others. We are apt to attend to the processes of life only because of their resultant. Inasmuch as this occupies the focus of our minds we reason backwards from products to processes, and finding in these none that might have rendered the cherished end impossible conclude that the events were all along aiming at what from our standpoint seems the crowning glory of them all. A chemist from the same standpoint could show that nothing in the genesis of nitrogen interfered with the development of the remarkable properties which this element exhibits during its adult stages. Clearly this conclusion would have only an anthropocentric basis.

Is there then no purpose in the living world? I should be loathe to admit it since I thought I had a purpose in coming here this afternoon. How-

ever, I should be equally loathe to admit that my purposes are not capable of further analysis. In fact, I believe, though I cannot as yet prove, that exhaustive knowledge of my physical and chemical make-up would show not only how I happen to have purposes, but why they are my own, and in some unique way different from all other purposes that I know about.

There are those however, who claim for my purposes and their own no such degrading alliances. Rather are they characterized by an absolutism beautiful to contemplate in its completeness. They lead a charmed existence independent of the great material basis to which I am willing to attach them.

Those who start from this premise have great advantages. With purpose freed, not from its substrate, but rather its encumbrances, they are at liberty to let it flit where it will. And of this liberty it makes ample use. It can now be seen even where the machinery for it is lacking. Purpose becomes coincident with life. Nay, even that which does not live becomes permeated by the same benign influence.

This conclusion is entirely logical. In fact it is necessary. Yet it is also fatal to vitalism. If the entire universe is purposeful, what becomes of the unique distinction of living things? From this standpoint the whole of nature is but a single experience in purpose and from a single experience we can infer nothing. But even if we could, would the biologist be in a peculiar position to defend purpose in his field? Would not the same great privilege fall to the engineer, the physicist, chemist, and astronomer?

If consistent vitalism brings us to universal purpose, surely it is time for special purposes to take their departure from the biological stage as explanatory principles especially suitable to the needs of the naturalist.

But will they? I doubt it very much. As long as there remain unexplored regions in nature, no ghost need be without a home. Certainly argument is incapable of dislodging them. Certainly too, the human race will continue—perhaps not entirely to our disadvantage—to produce minds to whom a part of nature appears more mystical than the whole. I believe, if I may sum up my position in a word, that the mechanistic-vitalistic controversy has its basis in constitution—in temperament.

THE BIOLOGICAL SURVEY OF MICHIGAN AND THE TEACHING OF ZOOLOGY.

PROFESSOR ALEXANDER G. RUTHVEN, UNIVERSITY OF MICHIGAN.

It is probably not generally known to the teachers of biology in Michigan that the Michigan Geological and Biological Survey and the Museum of Zoology of the University are cooperating in a survey of the fauna and flora of the state, and that it is intended that the data shall be made available to schools. The work was begun by the Museum in 1903 and was taken up

by the Survey in 1906. A large amount of material has been gathered, but as the facilities for work are meager and the available field workers very few only a small part of the work has been finished.

It is believed by the men who are directing and assisting in this work that, aside from the scientific value of a knowledge of Michigan zoology, it is desirable to stimulate an interest in natural history and that local natural history rather than detailed morphology should be taught in the public schools. Without going into the reasons it may be said that this opinion seems to be confirmed by recent developments in zoological teaching. Cummins* is undoubtedly correct in saying that other teachers share with him the belief that "undue emphasis on structure is the chief weakness of high school zoology." Several of the most successful teachers of zoology in Michigan have abandoned in part or entirely the type course in favor of a course introducing more natural history or at least more work on local forms.

This view is further reflected in the change in entrance requirements in zoology at the University. In the year 1914-1915 the requirements were as follows:

> "An applicant who offers a unit in zoology will be expected to have a knowledge of at least eight of the following animal types: 1 and 2. Two protozoa: Amœba, Paramœcium, Vorticella, Stentor, Volvox; 3. A sponge: Spongilla or Grantia; 4. A hydroid: hydra to be compared with a medusoid form; 5. An echinoderm: starfish or sea urchin; 6. An annelid: the leech or the earthworm; 7. A crustacean: crayfish, lobster or crab; 8. An insect: butterfly (including immature stages), grasshopper, cricket, cockroach or other insect; 9. A mollusk: the fresh water mussel or one of the snails; 10. A fish: minnow or perch; 11. An amphibian: frog, tree toad, toad, salamander (Ambystoma), or mud puppy (Necturus).
>
> "These forms must be studied by the laboratory method. Laboratory work should be directed, not merely toward a study of animal structure, but as far as practicable toward the study of habits and reactions. It should furnish the basis for the classroom discussion of principles; especially of evolution. Of the four periods per week that must be given to the work, two at least should be given to recitations or other class exercises. Careful original notes and drawings must be presented by the applicants as part of the examination."

Contrast these requirements with those now in effect:

> "The unit or half unit in zoology must include laboratory and field work as well as classroom exercises. Wherever possible, two classroom periods should be available for each field or laboratory exercise. Two or three such exercises with two or three recitations per week make a suitable distribution of time.

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* The Present Status of Zoological Teaching in Michigan High Schools. *School Science and Mathematics*, XVI, 805-813, XVII, 18-24.

"The content of the course should be determined in some measure by local conditions, such as size of class, accessibility of suitable conditions for field work, and training and interests of the teacher. Study of types is essential, but these should be selected largely from the local fauna. Such study need not take up the details of internal structure nor require dissection by the student. As far as possible, the course should deal with living animals and should emphasize the functions, activities and relations to environment of the types selected rather than their morphology. But the study of types should serve merely to introduce the student to the local groups to which they belong. The outlines of the classification of these groups, recognition in the field of their common local representatives and their habits, life histories and ecology should form the larger part of the course. Emphasis should be placed on facts and principles that have a peculiar local interest and on the economic phases of the subject. In the small towns, field work and topics related to agriculture may be emphasized. In the cities, the work may have to be conducted largely on types and in the laboratory but types of economic importance should then be selected and the zoological aspects of civic biology given special attention."

It is not to be denied that the teaching of the natural history of the local forms has its difficulties. Three of the greatest of these seem to be (1) the scarcity of teachers trained to teach the subject, (2) the meager knowledge of the fauna of many localities, (3) the difficulties of acquiring and preserving such laboratory and demonstration material as is necessary, and (4) the lack of texts on the local fauna.

The task of training teachers who can teach natural history falls upon the University, normal schools and colleges, and the University at least has taken it up. I may point out that the introductory course is no longer a type course but one dealing with principles, and students preparing to teach zoology are required to take in addition to this course and along with other work a year of ecology to secure the recommendation of the department of zoology.

The second difficulty, the meager knowledge of the local faunæ, is being overcome by the work of the Survey. Every year materials on the distribution of animals within the state are increasing, and we will shortly know, at least in a general way, the main elements in the fauna of every part of the state. The results of the study of this material appear as regional reports, miscellaneous papers, and monographs, all of which are available to teachers.

The third difficulty, that of obtaining local material for study purposes, is a very real one. It is easy to inform the teachers that local forms should be brought into the laboratory for detailed study, but this is very often difficult or impossible. Specimens of many forms, for example birds protected by law and such secretive forms as the weasels, cannot be gathered at will,

and, what is more, even when available, specimens of many kinds can be properly preserved for study only by a trained preparateur. Fortunately the Museum of Zoology is in position to obviate this difficulty by providing specimens for class use, and it is assisted in this by the fact that it is the repository of the biological data of the Survey and thus is enabled to determine what specimens are needed. This work was begun a number of years ago and is being slowly developed. It has been found to be most practicable to offer the specimens as loan collections, for there are frequent changes of teachers and policies in the schools and the facilities for caring for permanent collections are generally inadequate. A few loan collections have been made up and these are sent out upon request, the only requirements being that they be returned when the work has been completed, that the expenses of transportation be borne by the schools, and that the specimens be handled with care. The loan collections have not been advertised, because the demand for them is already increasing faster than additional series can be prepared, but it is hoped that in time every school in the state which desires such collections can have them.

The fourth difficulty, a lack of proper texts, is also a very real one. I refer here to publications which will assist the teacher in the determination of local forms, which summarize what is known of the habits, life-history and distribution of the species in Michigan, and which contain information on the collecting and preservation of specimens. The monographic reports of the Survey will partly overcome this difficulty but to more nearly meet the need of the teacher and student the preparation and publication of a series of illustrated manuals on Michigan zoology is also contemplated. For example it is proposed to prepare such manuals as the moles and mice of Michigan, the common butterflies of Michigan, the common beetles of southern Michigan, etc. It is planned that these manuals shall be scientifically accurate but so prepared that they can be used in the schools. To meet the same need the Museum has in preparation a series of pamphlets on the preservation of specimens which can be used by the teacher both as a guide for the preparation of specimens for class use and as directions for laboratory exercises in the proper care of specimens.

I may then summarize the contributions which the Museum and Survey of the state may be expected to make to the teaching of zoology as (1) the increase of knowledge of the fauna of the state, (2) the building up of loan collections, and (3) the preparation of publications suitable for use as texts. Progress in this work must of necessity be slow but there is reason to believe that it will be certain, and in view of this the thing most to be desired now is that teachers of zoology will more and more use local material and emphasize natural history rather than detailed morphology or any other phase of zoology which is largely concerned with organs rather than with the animal as a living organism in its natural environment.

COMMERCIAL CONFERENCE

INVESTIGATION FOR REPORT ON "WHAT BUSINESS MEN EXPECT OF THE HIGH SCHOOLS."

MR. T. S. ROCKWELL, CHICAGO, ILL.

Method of Investigation.

The Bureau of Business Standards of the A. W. Shaw Company mailed 500 questionnaires to Michigan business men. In this investigation replies were received from 82 or 16.4%. These results may be accepted as very indicative and reliable within a very few percent. For the 16 years' experience of the company in collecting business data is that *indicative* results are secured if replies are obtained from 10 or more percent of a mailing of 500 questionnaires.

At the outset it should be realized that any school at small expense by a similar local questionnaire investigation can determine exactly the requirements of the different classes of trade in their communities. In other words, what the Shaw Bureau of Business Standards has done for the whole state of Michigan by a broad investigation, each school can do more intensively by the same method of investigation. Finding out the exact needs of the business community each school then may set up a course of study to meet these needs with assurance of good results, not only for the student, not only for the employer, but also with the natural increase in business efficiency for the community itself.

Number of questionnaires mailed—500.

List—Selected subscribers to *System,* the Magazine of Business, and *Factory,* the Magazine of Management, in Michigan.

Number of replies received—82.

Number of firms reporting—81 in all: 43 manufacturers; 3 insurance agents; 17 retailers; 8 bankers; 10 miscellaneous—real estate agency, public utility, grain company, a business men's association, etc. (two replies were received from one firm).

Total number of employees in firms reporting—50,000.

Employees per firm reporting—1 to 20,000; 31 firms had 20 or less employees.

Number of towns from which replies were received—23; population ranging from 300 (Byron Center), to 465,000 (Detroit).

Position of those replying—President, secretary, office manager, general manager, treasurer, superintendent of agents, cashier, merchant, industrial engineer, general storekeeper, salesman, purchasing agent, lawyer, accountant, advertising director, cost clerk, factory manager, director of bureau of research of a national association of manufacturers.

ANALYSIS OF QUESTIONS.

— 1 —

What, in Your Judgment, is the Chief Weakness or Difficulty of the High School Boy in Adapting Himself to the Requirements of Your Business?

The big, outstanding difficulty was the lack of training in business practice. Weaknesses in "personal qualities" were established as follows: Lack of responsibility, 28% ; lack of concentration, 19% ; impatience at slow progress, 13% ; lack of initiative, 9% ; lack of adaptation, 9% ; inability to analyze, 9% ; lack of appreciation of the nobility of labor, 4% ; inability to grasp the importance of detail, 3% ; lack of imagination, 3% ; lack of thrift, 3%.

— 2 —

How, in Your Judgment, Can Your High Schools Overcome This Weakness or Difficulty.

1. By introducing courses in more specific business training such as Office Practice and Salesmanship. It was suggested that a four-year course in Commerce be given. Several suggested dropping ancient history, dead languages, etc., to make room for the other courses.
2. By allowing the students to select some of their courses; for example, shorthand and advertising.
3. By having students visit outside offices, stores and factories, on regular school time.
4. By getting business men to give some of the lectures.
5. By a part-time school—spending part of each day or week in the classroom and part of the day or week in a business concern.
6. By developing personal qualities of the students. (See question 1.)
7. By hiring teachers of business experience. It was suggested that the teacher of business subjects ought at least to spend some of his or her summers in business.
8. By providing better equipment.
9. By the establishment of expert vocational guidance n the school.

— 3 —

What is the Chief Weakness or Difficulty of the High School Girl in Adapting Herself to the Requirements of Your Business?

1. In addition to the points listed under Question 1, special mention was made as follows: carelessness; too great a desire for pleasure; dress; no incentive for future; physical weakness. One business man stated that girls were often "quicker to get things and of a higher moral calibre than boys."

—4—

How, in Your Judgment, Can Your High Schools Overcome This Weakness or Difficulty?

1. In addition to the points listed under Question 2, by training girls to consider business more seriously as a vocation.
2. By developing greater pride in her work.

—5—

Do You Believe That a High School Student Should be Given at Least a Broad Elementary Viewpoint of All the Activities of Business, Manufacturing, Retailing, Selling, Office Work, Etc.

Yes—74; No—4; No reply—4.

—6—

In Your Judgment Would This Help the High School Student to Know Better in What Line He Should Engage?

Yes—69; Yes with vocational expert—3; No—3; No reply—4; Doubtful—3.

—7—

Do You Believe That the High School Student Should Be Instructed in Salesmanship?

Yes—57; Optional—6; No—16; No reply—3. Retailers were practically unanimous for the Course, only one voting "No" for this work.

—8—

Do You Believe That the High School Student Should Know the Methods of Advertising which Busines Men Have Proved Out?

Yes—43; Optional—5; No—18; No reply—5; Helpful but not necessary—9; Doubtful—2.

—9—

What Do You Consider the Relative Importance of the Subjects Below in the Training of High School Students?

Please indicate importance by marking the subject of first importance by the letter "A," etc. (Advertising, Bookkeeping, Business Arithmetic, Business Correspondence, Salesmanship, Business Organization, Office Training, Shorthand.)

The standing of the courses were as follows: First Choice—Business Organization—23; Business Arithmetic—23; Business Correspondence—20; Bookeeping—17; Office Training—10; Salesmanship—10; Shorthand—6;

Advertising—5. Adding the total votes cast for the first three selections, percentages are as follows: Business Organization—42; Bookeeping—41; Business Correspondence—40; Business Arithmetic—39; Office Training—34; Salesmanship—31; Shorthand—19; Advertising—19.

Summarizing all the votes cast, standing is as follows: Business Correspondence—59; Salesmanship—57; Bookkeeping—56; Business Arithmetic—55; Business Organization—54; Advertising—53; Office Training—49; Shorthand—46. The general conclusion from thse tabulations seems to be that Shorthand and Advertising should be obtional subjects. It is also clearly evident that business men demand a general course in business (Business Organization) and courses in Office Training and Salesmanship.

THE RELATION OF THE UNIVERSITY COURSE IN COMMERCE TO THE HIGH SCHOOL COMMERCIAL COURSE.

ARTHUR L. LORING, WESTERN STATE NORMAL SCHOOL, KALAMAZOO, MICHIGAN.

OUTLINE.

The condition of secondary commercial education in the United States is the result of a growth characterized by a lack of definite aim, poor organization and confused ideas. The standard so far as there has been one, has been the community standard, one which varies with the ideals and immediate needs of every community. Recognition of work by the University, no matter how desirable, has been impossible.

The curriculum with which we have to deal is not a curriculum in the sense that each study is a related part of a plan. It is an assemblage of fragments which seem to have no single aim. It is posible to correlate these fragments provided we know their nature and the ends toward which we are working.

The problem of correlation involves two distinct duties: the duty of the school to the industrial community in which it is located; and second, its duty to the student who may continue his work in college. We agree that the paramount obligation is the first one.

Any solution will be influenced by the fact that the two schools are only incidentally related. They both prepare for a business career—but for different kinds. The high school endeavors mainly to train its product for clerical positions, while the University for managerial positions. If the work continues to develop along these two lines there can be no correlation. Clerical training is not a preparation for university work in commerce.

If any correlation can be affected it will become evident only through a clear statement of aim and a somewhat uniform High School curriculum.

The standard, in any case, on which any organization may take place must be a dual standard: one which will prepare a student for clerical duties and also give him the foundation on which to build a broader education. Its possibility may become apparent on examination of the present curriculum. The studies now offered might be divided roughly into three classes:

(A) General or non-vocational subjects:

Varying in different schools, usually English, History, some mathematics and some language.

(B) Related subjects:

Economics, Commercial Law, Commercial Geography, Accounting and such studies as Advertising, Merchandizing, or Salesmanship which have to do with the internal problems of industrial management.

(C) Vocational subjects:

Business Correspondence, Bookkeeping, Office Practice, Commercial Arithmetic, Shorthand, Typewriting, Spelling and Penmanship.

This classification was based upon a report on Commercial Education by Mr. F. V. Thompson, Assistant Superintendent of Schools, Boston.

The general studies are the same as those required for other High School pupils. Their retention in the course is based upon the argument that business is a profession, not a trade: that the same kind of education suitable for the future lawyer or doctor is needed for the future business man but that no more than 50 or 60 per cent of the time need be given to it. Should such studies as are classified under the second group be recognized they could serve as an elementary basis on which the student might continue his work in college. Every course is indirectly connected with the function of the manager.

The third classification might vary according to the needs of the community.

It is very probable that the university courses in Commerce will become more intensive and technical as time goes on. If so, the high school will have the task of taking over a certain amount of vocational work in preparation, and altho it is possible that it may never include the larger part of the course, yet it will be a definite and specific task.

I have no definite plan for reorganization, but I have a suggestion which I wish to present for your consideration. Let a committee be appointed by our executive committee and a representative of the university, composed of heads of commercial departments over the state, a high school principal interested in Commercial Education and a member of the Department of Econmics of the University. Let it be their duty to define the aim of commercial work, draw up a uniform program sufficiently elastic to care for community needs, and to outline each subject in order that later committees on syllabi may be guided thereby. Such a task might take more than a year, but I am satisfied that the results would justify the labor.

Reorganization of commercial courses is bound to come. Already definite work has been done by the Universities of Illinois and Chicago, acting in connection with conferences.

Why is it desirable to establish a dual standard—or to attempt to correlate? It is best put by Mr. Guy M. Pelton of Evanston. In high school in an article printed in the business journal last year, he says:

"To my mind, there is one reason for such a course of procedure, that stands high above all others, and that is the necessity for recognizing vertical, rather than horizontal opportunity. Any scheme of education that sets aside a certain group of individuals and tends to limit their continuity of opportunity is fundamentally wrong. If there is any one, big, overpowering reason why this country should not recognize such a scheme, it is because it does not offer the maximum of service to society; and because it tends to strengthen a horizontal rather than a vertical stratification in society."

If we ever come to any definite agreement on this problem both high school instructor and university professor must enter in on the task with a mind open to conviction and a willingness to concede points which they may hold important.

It is my opinion that the university will appreciate the local problem of the high school.

ART CONFERENCE

WHAT AND HOW TO TEACH INTERIOR DECORATING AND COSTUME DESIGN IN THE PUBLIC SCHOOLS.

MISS AGNES VAN BUREN, GRAND RAPIDS, MICHIGAN.

Mr. Arthur Wesley Dow, of Columbia University, advocates teaching design, or art structure as he calls it, as a fundamental thing, with Interior Decoration and Costume Design as an application. "Design is the basis of all art work. Principle, the great thing, application, the small thing. Principle, the soul of art, application, its body. By principle, I do not mean a rule or formula or anything mechanical, but rather the guiding thoughts, the ways that lead to fine choice of line, tone and color, to discrimination in degrees of harmony."—Dow.

I believe sincerely in Mr. Dow's ideas. We should try to train the students to have a more critical judgment, to have a desire for finer form, for more harmony of tone and color in their surroundings and in things for daily use. This lack of appreciation on the part of the general public is responsible for a great expenditure of money and results in the manufacturing of useless and ugly things. Mr. Dow believes we must organize our work for a steady growth in good judgment as to form, tone and color, through all the grades, from the kindergarten to the University, and until we do this we cannot be the artistic and appreciative people that we would like to be.

It is still difficult to make many really, so-called, artistic people see that a mere training in drawing, painting and modeling is useless without practical application.

Well, how can we organize our work to secure this critical judgment on the part of our students? Do they have this sense of deciding upon form, tone and color, in their homes and in their dress after they leave our schools?

Do we give work in the kindergarten and first grade, so as to allow the children to have a choice as to color and arrangement in their design? If we do give them such a choice we really give them a beginning of what may later develop into art appreciation.

I have seen borders and surface patterns made by the kindergarten grades of Grand Rapids which are really quite attractive in design and color. The Supervisor Miss Anna Blanchard, has a set of colored tablets in different sizes and in colors which they combine to make good designs. These may be applied to wall paper and border, and all simple textile designs.

When the child thus arranges a few units in a border, he is using a simple appreciation of rhythm and is laying the foundation for future expression. Of course, this beginning of design in our schools must depend largely

upon the good critical judgment of the teacher, who leads the child to select harmonious colors and designs of good spacing.

Accuracy, of course, is not the chief end to be secured in the primary work, but in the third grade pupils can be taught to do accurate spacing and careful tinting, using colored crayons.

This may be applied to rug designs, simple stripes and checks.

I believe that color should be used through all the grades and applied to designs, the colors being adjusted to one another in place in the design.

Henry Turner Bailey says that fine coloring can never be secured through practicing scales.

It is really the same as expecting to be able to learn to play beautiful harmonies on the piano, by practicing scales over and over again.

In the upper grades, the children should be prepared to make more difficult designs using three or more tones. Now, in the upper grades, we should begin to relate the work more and more closely to house decoration and room furnishings, in which we can apply the studies of good form and color directly. If they have had a progressive training through all the grades in fine relations of space, tone and color, they can now apply it directly to these problems, and when they leave school they will be much better prepared to become wage earners. This training is sadly needed in our own country, as shown by some of the inharmonius colors in American spring fabrics now being shown. (Show samples of cloth.)

When the student enters the High School, we have this one thing to contend with: The Universities and Colleges have not yet recognized the cultural value of art training to the extent of giving enough credit to attract the average student to give the necessary time to Art. Art is made elective in nearly all the High Schools and many of our best Art students are obliged to take many academic subjects when they expect to require art training in their life work.

How long will this unfortunate state of affairs continue? High School teachers ,at present, in many of the states, are obliged to have small classes, and to give almost entirely personal instruction. This is one of the questions that I trust may be discussed this afternoon, for without larger classes we cannot hope to accomplish far-reaching results. We all know that this is the present condition of Art work: In the grades, pupils are given from 1 hour to 2 hours per week for Art training, and many of these students do not get any art training at all in the High School . With all our art theories and art courses, we can do very little if we can not reach more pupils.

EDUCATIONAL CONFERENCE

ADMINISTERING THE RELATIVE MARKING SYSTEM.

FREDERICK S. BREED, UNIVERSITY OF MICHIGAN.

A number of our higher institutions of learning have within recent years adopted the relative system of assigning marks to students. This system is in reality an application of the psychology of individual differences or, more specifically, our knowledge of the nature and distribution of individual differences in intelligence.

Measurements in sufficient number and of sufficient accuracy have now been made to show that mental functions or abilities vary, with respect to a given quality or characteristic, according to the curve of probability. These measurements are necessarily of reaction, response, performance, achievement. We measure mental ability through achievement because there is no other known way to measure it. Careful students of the problems of marking are for the most part convinced that teachers should mark ability in the same manner that the psychologist measures ability, namely, through reaction or achievement. And since measures of achievement are found to be distributed according to the curve of probability, marks representing achievement of students should be distributed approximately according to the same curve.

Numerous objections to this system have been raised, most of which do not appear formidable when the system is properly understood. The greater number of these objections arise either from misconceptions of the system or from faults in its administration.

The present study was undertaken to throw some light on methods of administering the relative marking system. It was hoped that our findings might be of value not only to the increasing number of colleges and universities that are adopting the system, but might also aid the still greater number of high schools that are sure to adopt the system in the near future. The reasons for using this plan of marking in the secondary schools are even more potent than those for its use in the higher institutions.

During the second semester of the academic year 1911-1912 the College of Literature, Science, and the Arts of the University of Michigan began the use of the relative marking system. It seemed to the writer worth while to study certain results of this educational experiment. It was decided to determine as accurately as possible the distribution of marks for each sex, for each class, and finally for the college as a whole, with a view especially of discovering the degree of skewness of the actual grading curve. The data were made available through the courtesy of Registrar Hall.

The essential features of the Michigan plan are made clear in the following excerpt from a letter of the Registrar to the members of the faculty:

"Please use in your reports only the letters: A, B, C, D, E, I, X. In the *long run* the distribution should be about as follows: A, not more than 10%; B, 15 to 20%; C, 40 to 50%; D, 15 to 20%; E, about 10%."

"I" means incomplete; "X," absent from examinations. It might further assist in the interpretation of the data hereinafter presented to explain that students were graduated who had earned 120 hours of credit together with 135 points. For students graduating prior to June, 1916, the requirement was 120 hours and 120 points. Each hour of credit was valued in points as follows: A, three points; B, two points; C, one point; D, no points; E, no hours of credit and no points. This legislation regarding points went into effect just prior to the first marking under the new system.

As a further fact of importance, it should be stated that the marks of the first semester under the new system were published after the close of the year 1912-1913 as were also the marks for 1913-1914 at the end of that year.

TABLE I[1]

DISTRIBUTION OF MARKS IN PERCENTAGE, LITERARY COLLEGE, UNIVERSITY OF MICHIGAN, TWO YEARS, 1912-1913 AND 1913-1914.

			PERCENTAGE OF SEMESTER HOURS OF EACH MARK				
CLASS	SEX	NO. OF HOURS	A	B	C	D	EXI
Freshman							
	Men	37225	7.8	26.8	43.7	14.8	6.8
	Women	11274	15.0	41.7	33.2	7.3	2.7
	Average		9.6	30.3	41.3	13.0	5.8
Sophomore							
	Men	23328	8.2	29.7	46.7	10.9	4.4
	Women	9596	15.5	43.6	34.7	4.8	1.2
	Average		10.4	33.7	43.5	9.0	3.5
Junior							
	Men	15023	13.3	37.7	40.1	6.7	2.0
	Women	11186	19.2	45.3	31.2	2.9	1.4
	Average		15.8	41.1	36.4	5.1	1.6
Senior							
	Men	12280	15.7	43.5	35.2	4.2	1.2
	Women	9290	21.3	49.8	27.1	1.6	.3
	Average		18.0	46.2	31.6	3.1	1.1
College							
	Men	87856	9.9	31.8	42.7	10.9	4.6
	Women	41346	17.7	44.9	31.6	4.3	1.5
	Average		12.	36.	39.	9.	4.

[1] For the tabulations necessary for the construction of this table I am indebted to the careful work of Mr. I. M. DeVoe, now of the Highland Park, Michigan, High School.

In Table I is presented in condensed form the distribution of marks for two years, 1912-1913 and 1913-1914, the two years immediately following what may be termed a preliminary semester's experience with the system. The figures under the several marks represent percentages of semester hours. A semester hour is one hour of recitation a week for a semester. The results represent the tabulation of 129,202 semester hours.

As regards variation with sex, the percentages show a greater preponderance of the higher marks for the college women, and incidentaly indicate the pronounced scholastic superiority of the college woman in all four classes. This is seen best in a comparison of the percentages of A and B. While a more accurate measurement of the relative scholastic ability of college men and women can be obtained by a comparison of grades within the same courses, the result so obtained would probably be but slightly different from the one found here.

The distribution of marks for the freshman class shows a fairly close approximation to the probability percentages, as close, perhaps, as should be expected, considering the factor of selection and the variability due to age, race, previous training, and the like. The curve of actual grading is increasingly skewed in the direction of less ability as the senior year is approached. While opinions will vary regarding the change in degree of skewness to be expected in passing from lower to higher classes, few would dispute the claim that as a whole the marking exhibited in Table I is too high.

The general tendency of this marking is shown in the average percentages for the college at the end of the table. The degree of departure from the norm may be easily seen when these percentages are compared closely with the percentages officially adopted:

TABLE II.

Average Distribution of Marks in Percentage for a Period of Two Years, in Comparison with the Adopted Norms.

	A	B	C	D	E	EXI
Norms	10	17.5	45	17.5	10	..
Marks	12	36	39	9	..	4

One of the significant features of Table II is the excessive number of marks of B grade. This is probably partially accounted for on the theory that the 135-point requirement tended to lower the value of C.

For those who are interested in studying the direction of the variation from year to year in reference to the standard, the data in Table III are presented. These percentages, gathered from records in the office of the Registrar, based on the total number of marks assigned of grades A to E, show relatively slight change in the faculty standard after the first preliminary semester.

TABLE III.

TENDENCY IN MARKING DURING THE FIRST FIVE SEMESTERS.

PERIOD	PERCENTAGE OF EACH MARK, BASED ON NUMBER OF MARKS				
	A	B	C	D	E
1911-1912	14.2	33.5	40.2	9.6	2.6
1912-1913	13.2	37.7	37.9	8.2	2.9
1913-1914	13.2	37.1	38.9	7.9	2.8

In Table IV a comparison is made between the marking of 1912-1913 and 1913-1914 in percentages based on the total number of semester hours elected.

TABLE IV.

TENDENCY IN MARKING DURING THE YEARS 1912-1913 AND 1913-1914.

PERIOD	PERCENTAGE OF EACH MARK, BASED ON NUMBER OF SEMESTER HOURS				
	A	B	C	D	EXI
1912-1913	12.2	36.1	39.	9.1	3.6
1913-1914	12.6	36.	39.4	8.4	3.6

Probably the most pronounced feature of the figures shown in Table IV is the similarity in the marking for the two years represented. There is, if anything, a slight tendency to higher grading. The tendency of this marking in the "long run," so far as the figures in the above tables are indicative, is not noticeably in the direction of greater conformity with the adopted standards. However, so long as credit is not given for quality, there is no special danger in the use of a curve not precisely bi-symmetrical. Uniformity is the essential thing, for without uniformity injustice demonstrably results.

The University of Missouri preceded the University of Michigan in the adoption of this system of marking, with the following standard percentages: 3, 22, 50, 22, 3. A study of the marks assigned by their faculty during the first two years of the system shows the following percentage distribution, beginning with the highest mark: 4, 21, 52, 16, 7. The relatively close conformity with the standard was largely due to the work of a special committee in charge of administering the plan.

Even if a university succeeds in standardizing its marking of students so that the marks come to have a clearly defined meaning, as is possible with this system, there is another important reform that may follow on this achievement, namely, giving credit for quality. Cattell was one of the first to advance scientific argument for the adoption of this principle, which involves giving more credt toward graduation to those obtaining the higher marks. Today, quite generally, credit is given for *quantity* of work, a required number of courses completed with a passing grade. Quality is but lightly stressed. Would it not be an incentive to better work in college courses if something more substantial than a mere phrase were awarded for

quality of work? Would not such credit be an additional and just recognition of scholarship?

This notion is neither new nor untried. The Literary College of the University of Michigan acknowledges the principle of credit for quality in at least three ways: (1) By assigning the values 3, 2, 1, and 0 to A, B, C, and D, respectively, in counting *points* for graduation; (2) By using (somewhat inconsistently) a second series of quality values, 1.5, 1.25, 1, .5, and 0 for A, B, C, D, and E, respectively, in rating the scholarship of house clubs and fraternities; (3) By giving degrees with distinction on the basis of the first set of quality values.

The University of Missouri, however, has gone a step further and gives credit toward graduation on the basis both of quantity and quality of work. Professors Cattell and Max Meyer and President Foster have urged the adoption of this principle for some years and have adduced some of the most cogent arguments in favor of its practical acceptance. Table V shows credit values that have been assigned to the several marks in common use, side by side with the fraternity series of Michigan.

TABLE V.

NUMERICAL VALUES ASSIGNED TO THE SEVERAL MARKS.

	A	B	C	D	E
Cattell	4.0	3.5	3.0	2.5	2.0
Missouri	1.3	1.15	1.0	.85	0.0
Foster[2]	10.0	8.5	7.0	6.0	0.0
Michigan	1.5	1.25	1.0	.5	0.0

It will be noticed that these four sets of values do not differ greatly when all are expressed in terms of the value of any one grade, for example C as the unit.

Of course the mere acceptance of such values by some person or institution is not enough to make them reliable. One naturally raises the question of their scientific validity. Cattell[3] long since suggested the method of scientifically deriving them. "I have found," he says, "in various fundamental traits that can be measured, such as accuracy of perception, reaction-time and memory, that ordinary individuals differ about as 2 : 1. It seems that the best men (say the first ten) in our classes differ from the poorest (say the last ten) in about this ratio. If, therefore, men are divided into five groups representing nearly equal ranges of ability and we give the C, or middle group, a credit of three points for a three-hour course, it would be just to give the A group 4 points, the B group 3½ points, the D group 2½ points, and the F group 2 points or less."

[2] W. T. Foster: Administration of the College Curriculum, 1911, p. 239.

[3] J. McKeen Cattell: Examinations, Grades and Credits, Pop. Sci. Mo., Vol. 66, 1904-5, p. 376.

This ratio, 2 : 1, is found to hold approximately in actual measurements of school work as well as in psychological tests. In the course of recent measurements of the quality of handwriting in the city of Highland Park, Michigan, the ratios given in Table VI were found to obtain between the best and the poorest groups in handwriting. The pupils in each division of each grade were divided into five groups differing from each other serially by approximately equal amounts of merit. The average enrollment of these divisions was 158.

TABLE VI.

RATIO BETWEEN THE BEST AND THE POOREST GROUPS IN HANDWRITING IN VARIOUS GRADES.

GRADE	RATIO	GRADE	RATIO
3B......	10.2:6.2	5B......	11.4:7.6
3A......	9.8:6.2	5A......	11.8:6.8
4B......	10.4:6.6	6B......	12.2:7.6
4A......	11.2:6.8	6A......	12.8:7.6

Studies in educational measurement help one to see more clearly how the ratio 2 : 1 is nearer the correct one than some such ratio as 5 : 1 based on the fact that the marking scale is divided into five steps differing from each other consecutively by equal amounts. While in practical current usage a grade of E is given a value of zero, in reality a grade of E is worth something more than zero. By giving E its actual value one might reason that A : E : : 5 : 1. This is manifestly incorrect, for in laying out a relative marking scale the point of reference or departure is the point of median ability. Sigma or probable-error units, or units in some fraction thereof, are then measured off in either direction from the median. When marks are established in accordance with these distances, the distance of any mark from any other becomes known, but the value of any mark in fraction or multiple of any other is not necessarily known. To get the ratio sought the measures must be on an absolute scale, that is, all values must be expressed in relation to zero amount of the quality measured. The 2 : 1 ratio has been determined in this manner. No serious error will be made, therefore, in the use of this ratio as suggested. All in all, the quality values based upon it are well founded and sufficiently conservative.

Finally, the writer is disposed to think that the expression, "credit for quality," is deceptive. Ordinarily, as observed above, students are graduated with much attention to the number of courses and slight attention to the height of marks. Credit for the number of courses is supposed to be credit for quantity; credit according to the height of marks, credit for quality. Tradition insists on two scales of "measurement," the more-less and the good-bad. It insists especially on the good-bad. It is fearful that the more-less will usurp the rightful territory of the good-bad. F. N. Scott[4]

[4] Fred Newton Scott: Efficiency for Efficiency's Sake, The School Review, Vol. 23, 1915, p. 37.

is a genial defender of this tradition. In an article which he has interposed between education and progress, he preempts certain sections of human nature, saying, "These things are qualities, not quantities, and any judgment of them, to be adequate, must be made in terms of quality." But, in all this, education is developing as science in various fields has developed. Qualitative studies precede, quantitative studies supersede. The good-bad basis of judgment is being superseded at point after point by the more-less. The average teacher of today may be content to grade a boy's memory good or bad, but psychologists have long since translated memory grades into quantitative scores and define good memory in terms of rapidity of acquisition, permanence of retention, and the like, memory being analyzed into its component qualities and these measured in units of time and reaction. If one say that qualities cannot be measured, the reply is that qualities are being measured everywhere about us. Probably this is most apparent among the most realistic things of the world, objects of sense, physical objects. The yard stick measures amounts of the quality length; the grocer's scales, amounts of the quality weight; the thermometer, amounts of intensity of heat. And while many qualities are not yet measured, the true scientist will seek to discover means of measurement rather than condemn them. Our critics are probably willing to accept 70 on the thermometer as the measure of a good temperature; they may soon come to accept 16 on the Thorndike handwriting scale as the measure of a good handwriting; and some day, perhaps, even a credit of 1.3 as the measure of a good mark.

Whereas, then, marks like A, B, and C are customarily supposed to be quality ratings, ratings of the good-bad sort, these ratings are fundamentally quantitative. What is here quantified belongs either to mental content or mental function. In the main a student is considered good if he amasses a certain amount of information in a course and his thought reactions occur with a certain degree (or amount) of rapidity, accuracy, fertility, and so on. Knowledge and power are fundamental educational aims, or should be, everywhere, and both are measurable.

Our contention is, therefore, that the A-B-C-D-E series of marks is in reality a quantitative series, that the quantities involved are with approximate accuracy measurable on the basis of the 2 : 1 ratio, that progress in education demands our recognition of this fact, while justice to the student demands our giving him credit accordingly.

NECROLOGY.

In the death of James Burrell Angell the Michigan Schoolmasters' Club mourns its most distinguished member. We miss his gracious and kindly presence at our meetings. His influence in the development of education in our State was ever constructive; it abides as a precious heritage. In his passing there went from our midst, though not from our memories, a friend whose life will always be to us an inspiration and a benediction.

The passing of Lawrence Cameron Hull removed from our Club a founder and charter member. We feel a deep indebtedness to him for the initiative which led him to join with others in organizing the Schoolmasters' Club, for the service which he rendered as its first President, and for the care and interest with which he followed its work from the beginning. He effectively advanced the interests of sound education, and we cherish his memory as that of a faithful co-worker, a man true to the highest ideals of culture and life, a firm and loyal friend.

In the death of Walter Dennison the Michigan Schoolmasters' Club has lost a life member, who in many years of service in the State proved himself an earnest and effective champion of the highest educational deals. We desire to make a record of our appreciation also of his service in the advancement of learning, of his achievements as an investigator in the field of the ancient Classics. We cherish the memory of his noble and helpful life, and of his true and kindly heart.

F. W. Kelsey,
B. L. D'Ooge.
S. O. Hartwell,
Committee.

SYNOPSIS OF BUSINESS MEETING

HELD IN UNIVERSITY HALL, MARCH 30, 1917.

The meeting was called to order by President C. O. Davis.

The minutes of the last annual meeting were read by the Secretary, L. P. Jocelyn, and approved.

The reports of the Secretary-Treasurer and of the Auditing Committee were read and accepted.

The report of the Teachers Retirement Fund Committee made by its chairman, Principal W. W. Warner, was accepted and adopted.

The Nominating Committee made the following report: President of the Club, Principal W. W. Warner of Saginaw; Vice-President, Miss Anna S. Jones, Grand Rapids; Secretary-Treasurer, Mr. Louis P. Jocelyn, Ann Arbor. The report of the Nominating Committee was accepted and adopted and the officers declared elected.

Professor F. S. Breed, of the University, made a report of the Committee on Supervised Study in Michigan Schools. It was moved that the Committee be continued, to print their present study, to take up another if necessary, and that one hundred dollars be appropriated for the expense of such study. The motion prevailed.

It was moved that the Resolution of the Biology Conference be accepted and that its adoption be urged. The motion carried.

Professor F. W. Kelsey presented Resolutions on the death of three of the oldest and most loyal members of the Club—President James B. Angell, Mr. Lawrence Cameron Hull, and Professor Walter Dennison. Professor Kelsey also spoke upon the relief work for the Belgian children, but no action was taken.

Committee on Nominations.

General—E. J. Lederle, Hastings, J. B. Edmonson, University, Alice Marsh, Detroit, and the Secretary.
Classical Conference—A. R. Crittenden, University.
Modern Language Conference—Alice Rothman, Ann Arbor.
English Conference—E. L. Miller, Northwestern, Detroit.
History Conference—T. P. Hickey, Western Normal, Kalamazoo.
Physics and Chemistry Conference—F. R. Gorton, Normal College.
Mathematics Conference—W. E. Olds, Marshall.
Biology Conference—C. E. Barr, Albion College.
Commercial Conference—Dora Pitts, Western, Detroit.
Physiography Conference—F. W. Frostic, St. Charles.
Art Conference—G. P. Thompkins, Central, Detroit.

Manual Training Conference—J. R. Jenson, Grand Rapids.
Educational Psychology Conference—E. C. Warriner, Saginaw.
Home Economics Conference—Georgia L. White, M. A. C.

Committee on Necrology.

Professor F. W. Kelsey, University of Michigan.
Professor B. L. D'Ooge, Michigan State Normal College.
Superintendent S. O. Hartwell, Muskegon.

Committee on Resolutions.

Principal W. W. Warner, Saginaw.
Superintendent W. F. Lewis, Port Huron.
Mr. J. R. Locke, Highland Park.

Auditing Committee.

Professor A. G. Hall, University of Michigan.
Mr. John Merrill, Detroit.

Report of Committee on Necrology.

(See page 94.)

Report of Nominating Committee.

President—W. W. Warner, Saginaw.
Vice-President—Anna S. Jones, Grand Rapids.
Secretary-Treasurer—Louis P. Jocelyn, Ann Arbor.

Classical Conference--Chairman, F. O. Bates, Detroit Central; Vice-Chairman, Laura Wilson, South Grand Rapids; Secretary, Clara Janet Allison, Owosso.

Modern Language Conference—Chairman, Alice Rothman, Ann Arbor; Secretary, A. G. Canfield, University.

English Conference—Chairman, Emma G. Hunker, Bay City; Secretary, Helen Wood, Fenton.

History Conference—Chairman, G. O. Leonard, Highland Park; Secretary, Mary Harden, South Grand Rapids.

Physics and Chemistry Conference—Chairman, W. H. Clark, Detroit Northern; Vice-Chairman, C. W. Greene, Albion College; Secretary, G. I. Altenberg, Highland Park.

Mathematics Conference—Chairman, W. H. Pearce, Normal College; Secretary, J. E. Porter, Detroit Northwestern.

Biology Conference—Chairman, Ethel Chase, Detroit Central; Secretary, Helen B. King, Saginaw.

Commercial Conference—Chairman, L. M. Hazen, Detroit Southwestern; Vice-Chairman, O. V. Adams, Ann Arbor; Secretary, Anna M. Yorks, Highland Park.

Physiography and Geography Conference—Chairman, R. D. Calkins, Central Normal; Secretary, F. W. Frostic, St. Charles.

Art Conference—Chairman, Katherine C. Margah, Highland Park; Secretary, Agnes Van Buren, Grand Rapids.

Manual Training Conference—Chairman, A. E. Bowen, Western Normal; Secretary, C. L. Dorsey, Highland Park.

Educational Psychology Conference—Chairman, C. M. Elliott, State Normal College; Secretary, J. F. Thomas, Detroit Normal School.

Home Economics Conference—Chairman, Deda L. Emmons, Northwestern, Detroit; Secretary, Mary Faulkner, Traverse City.

Report of Committee on Resolutions.

WHEREAS: The change in the Teachers' Retirement Fund Law, known as the McArthur amendment, now before the legislature, will, if favorably considered and put into effect, destroy the usefulness of said law and amount practically to its repeal, and

WHEREAS: The Teachers' Retirement Law was passed by the legislature but two years ago with the approval and the full endorsement of organized education in Michigan as expressed thru the Michigan State Teachers' Association, the State Superintendents' Association, the State Federation, the State Federation of Teachers' Clubs, the Schoolmasters' Club, and also received the active sympathy and support of hundreds of individual teachers of ability and experience, and

WHEREAS: The Supreme Court of the State has, within the year, declared this measure constitutional and thus supported its fundamental principles as embodied in the present law,

Resolved, That it is the sense of this body that, to forward the professional improvement of the teachers of this State, the Teachers' Retirement Law should not be impaired by the adoption of the so-called McArthur amendment, or any similar change in the law as it now stands upon the Statute books, and

Resolved, That inasmuch as no new data is now available for the present legislature that was not accessible to the legislature of 1915 when the law was passed, saving alone the absolute certainty that the law is constituional, which fact can in no wise impair its usefulness or be counted to its discredit.

Resolved, That this body respectfully petition the legislature to decline to adopt amendments thereto before said law has had time to be tested out, tried and its defects as a progressive professional measure established in a just and scientific manner.

W. W. WARNER,
W. F. LEWIS,
J. R. LOCKE.

FINANCIAL REPORT OF THE SECRETARY-TREASURER, 1916-1917.

1916		*Receipts*	
March	25	Balance as per last report, Commercial Department	$127.61
March	25	Balance as per last report, Savings Department	25.54
March	29	Deposit dues	65.00
Oct.	16	Deposit advertisement	10.00
March	30	Deposit dues	340.00
March	31	Deposit dues	306.50
April	1	Deposit dues	42.00
June	16	Deposit dues	35.00
June	28	Deposit dues	3.00
Sept.	29	Deposit dues	1.00
Sept.	29	Deposit advertisement	5.00
Oct.	2	Deposit advertisement	2.50
Oct.	12	Deposit advertisement	4.00
Oct.	24	Deposit sale of Proceedings	70.00
Dec.	12	Deposit dues	1.00
1917			
Jan.	2	Deposit sale of Proceedings	50.00
Jan.	2	Deposit advertisement	10.00
Jan.	26	Deposit dues	2.00
Jan.	26	Deposit interest	.74
		Total results	$1100.89
		Total disbursements	955.63
		Total balance	$ 145.26
		Deposit in Savings Department	26.28
		Deposit in Commercial Department	$ 118.98

1916				*Disbursements*	
March	31	Check No.	372	To Prof. C. H. Judd for Address	$ 50.00
April	3	" "	373	Archie Watt, 24 doorkeepers	27.80
April	5	" "	374	O. D. Morrill, Mathematics Conference	4.85
April	5	" "	375	F. R. Gorton, Physics Conference	1.50
April	7	" "	376	L. P. Jocelyn, 6 mo. salary—Oct. 1-April 1	100.00
April	18	" "	377	Ann Arbor Press, Printing and Badges	103 70
April	18	" "	378	Prof. Royal B. Farnum, address	67.75
April	18	" "	379	Alice V. Guysi, Art Conference	2.34
April	18	" "	380	Dr. James P. Haney, address expense	20.00
April	18	" "	381	Ann Arbor Times-News, ads for rooms	3.60
April	18	" "	382	H. J. Abbott, P. M., 2c. stamps	5.00
May	24	" "	383	E. L. Jocelyn, clerical work, An. meeting	4.35
June	13	" "	384	H. J. Abbott, P. M., 5c stamps for Proceedings	23 15
June	14	" "	385	Douglas Miller, delivering Proceedings in A. A.	1.60
June	15	" "	386	Ann Arbor Press, printing Proceedings	317.85

June 23	"	"	387	Nellie Easton, clerical work An. meeting.........	4.25
Sept. 26	"	"	388	Balance due for clerical work and office expense, 1915 meeting	10.29
Sept. 30	"	"	389	L. P. Jocelyn, salary Apr.1-Oct. 1, 1916..........	100.00
Sept. 30	"	"	390	One year clerical and office expense	59.00
Oct. 3	"	"	391	H. J. Abbott, P. M., 2c stamps	2.00
Dec. 5	"	"	392	H. J. Abbott, 2c stamps	2.00
Dec. 28	"	"	393	H. J. Abbott, P. M., 2c stamps	2.00
1917					
Jan. 5	"	"	394	O. D. Morrell, Letters (Davies)	.60
March 2	"	"	395	H. J. Abbott, P. M., 2c stamps	2.00
March 8	"	"	396	H. J. Abbott, P. M., 1c stamps for Programs.....	20.00
March 12	"	"	397	H. J. Abbott, P. M., 1c stamps for Programs...	10.00
March 17	"	"	398	H. J. Abbott, P. M., 1c stamps for Programs....	10.00
					$955.63

Report of Auditing Committee.

The Auditing Committee hereby reports that it has examined the accounts and vouchers of Louis P. Jocelyn, Treasurer of the Michigan Schoolmasters' Club and has found the same to be correct and accurate.

ARTHUR G. HALL,
JOHN MERRILL.

Meeting adjourned.

LOUIS P. JOCELYN, Secretary.

PROGRAM OF GENERAL SESSIONS

(Admission to all meetings of the Club by badge)

UNIVERSITY INSTITUTE AND LECTURES

Tuesday, March 27

9:00 o'clock

Sarah Caswell Angell Hall

Lecture: The Superintendent's Administrative Policy,
Professor Paul H. Hanus, Harvard University.

10:00 o'clock

Lecture: Measurement of Reading Ability,
Dr. Leonard P. Ayres, Russell Sage Foundation, New York.

11:00 o'clock

Conference: Professor Hanus.

2:00 o'clock

Lecture: Measurement of Achievement in Handwriting,
Dr. Ayres.

3:00 o'clock

Lecture: The Superintendent's Supervising Policy,
Professor Hanus.

4:00 o'clock

Conference: Dr. Ayres.

UNIVERSITY LECTURES

Small Lecture Room, Alumni Memorial Hall

11:00 o'clock

Rome, Mistress of the World,*
Professor Ralph V. D. Magoffin, Johns Hopkins University.

Upper Lecture Room, Alumni Memorial Hall

4:15 o'clock

Contemporary Pictures of Roman Life and Death,*
Professor Magoffin.

Wednesday, March 28

Sarah Caswell Angell Hall

9:00 o'clock

Lecture: The Aims, Scope and Methods of the Superintendent's Report,
Professor Paul H. Hanus, Harvard University.

10:00 o'clock

Lecture: Carrying the Community in School Surveying,
Dr. Leonard P. Ayres, New York.

Conference: Professor Hanus.

* Illustrated with the Stereopticon.

2:00 o'clock

Lecture: Actuarial Basis for Industrial Education,
Dr. Ayres.

3:00 o'clock

Lecture: Industrial Education Prior to and Accompanying Employment,
Professor Hanus.

4:00 o'clock

Conference: Dr. Ayres.

UNIVERSITY LECTURE

Small Lecture Room, Alumni Memorial Hall

11:00 o'clock

The Roman in his Hours of Ease,*
Professor Ralph V. D. Magoffin, Johns Hopkins University.

HIGH SCHOOL PRINCIPALS' ASSOCIATION

6:00 o'clock

Mack's Tea Room

Chairman—Principal H. R. Atkinson, Battle Creek.
Secretary—

1. Dinner.†
2. Address:
3. Address:
4. Report of District Chairmen.
5. Business Meeting.

Thursday Morning, March 29

JOINT SESSION OF SCHOOLMASTERS' CLUB AND SHORT TERM INSTITUTE

9:30 o'clock

University Hall

President—Professor C. O. Davis, University of Michigan.
Vice-President—Miss Nancy S. Phelps, Southeastern High School, Detroit.
Secretary—Mr. Louis P. Jocelyn, Ann Arbor.

1. Appointment of Committees.
2. Making Education Definite,
Dr. Leonard P. Ayres, New York.
3. The Superintendent's Educational Policy.
Professor Paul H. Hanus, Harvard University.

Thursday Afternoon, March 29

4:00 o'clock
Barbour Gymnasium
Gymnastic Drill by University Girls

* Illustrated with the Stereopticon.

† Open to all persons interested. Plates, at $1.00, may be reserved by writing to Homer Heath, of the Michigan Union, Ann Arbor.

MICHIGAN STATE FEDERATION OF TEACHERS' CLUBS

4:15 o'clock
Room B-2, High School

Chairman—Principal E. L. Miller, Northwestern High School, Detroit.
Secretary—Miss Lila Fyan, Northeastern High School, Detroit.
General Business Meeting of the Presidents of the Teachers' Clubs.

MICHIGAN INTERSCHOLASTIC ATHLETIC ASSOCIATION

4:15 o'clock

Room B-8, High School

Chairman—Principal H. R. Atkinson, Battle Creek.
Secretary—Mr. J. W. Matthews, Western High School, Detroit.

1. General Discussion of Interscholastic Athletics.
2. Action upon the Revised Athletic Rules.
3. Business Meeting.

UNIVERSITY LECTURE

4:15 o'clock

Upper Lecture Room, Alumni Memorial Hall

The Serious Work of Roman Life,*
Professor Ralph V. D. Magoffin, Johns Hopkins University.

Thursday Evening, March 29

8:00 o'clock

Hill Auditorium

GREEK PLAY

Iphigenia among the Taurians, by Euripides. Presented by the Classical Club of the University of Michigan, with Chorus. Music composed for this production by Professor Albert A. Stanley; staging, and Evolutions of the Chorus, designed by Professor H. A. Kenyon, University of Michigan.

In order to meet the expenses of the play it is necessary to make a charge for admission. Reserved seats, 75 cents; general admission, main floor, 50 cents. Translation, by Gilbert Murray, 25 cents.

Seats on sale Main Floor, University Hall.

If any balance remains after paying the expenses of the play it will be turned over to the American Red Cross.

Thursday Evening, March 29

8:00 o'clock

University Hall

SYMPOSIUM

General Topic: Unique Features of Some Michigan High Schools.
(Each speaker will positively be limited to ten minutes)

1. The Organization and Work of a Cadet Corps,
Mr. J. W. Wellwood, Flint.

* Illustrated with the Stereopticon.

2. Travel as an Educational Agency—The High School's Annual Trip to the City of Washington, D. C.,
   Principal William Prakken, Highland Park.

3. A Teacher's Open Forum,
   Miss Angeline Wilson, Grand Rapids.

4. School Gardens and Extension Work,
   Mr. R. A. Turner, Hillsdale.

5. A High School Advisory System,
   Principal John A. Craig, Muskegon.

6. Continuation Work for Girls over Sixteen.
   Miss Elizabeth Cleveland, Detroit.

7. Community Festivals,
   Superintendent J. E. Luidens, Cedar Springs.

8. The Motivation of Ancient History,
   Miss Leila M. Lowe, Benton Harbor.

9. Student Self-Government,
   Principal C. E. Drew, Holland.

10. Oral Expression Work in High Schools,
    Mr. Arthur Andrews, Grand Rapids.

11. Latin Exhibits and Latin Plays,
    Miss Flora MacKenzie, Battle Creek.

12. A Course in Citizenship,
    Miss Cora Willsey, Adrian.

Friday Morning, March 30

8:30 o'clock

University Hall

BUSINESS MEETING OF GENERAL ASSOCIATION

President—Professor C. O. Davis, University of Michigan.

Vice-President—Miss Nancy S. Phelps, Northeastern High School, Detroit.

Secretary—Mr. Louis P. Jocelyn, Ann Arbor.

(a) Reports of Officers.
(b) Reports of Committees.
(c) General Business.

9:00 o'clock

LITERARY MEETING OF GENERAL SESSION

1. Changing Conditions in Industry and in Education,
   Mr. F. C. Hendershott, Head of the Educational Department of the New York Edison Company, and Secretary of the National Association of Corporation Schools, New York.

2. Provision for Individual Differences,
   Mr. Franklin W. Johnson, Principal of Chicago University High School.

3. General Discussion.

Friday Afternoon, March 30

4:15 o'clock

High School Auditorium

A Summarization of all the Conference Meetings of the Club

Chairman—Professor C. O. Davis, University of Michigan.

General Topic: The Gist of the Conferences.
(Five minute summaries)

1. Classical Conference: Main Thoughts Brought Out at the Classical Conference,
   Miss Clara J. Allison, Owosso.
2. Modern Language Conference: Miss Matilda Schroeder, Ann Arbor.
3. English Conference: Mr. F. G. Thompkins, Detroit Central.
4. History Conference: The Trend of Thought in the History Conference,
   Miss Mildred Hinsdale, Central High School, Grand Rapids.
5. Physics and Chemistry Conference: What I Got Out of the Physics and Chemistry Conference,
   Mr. DeForrest Ross, Ypsilanti.
6. Mathematical Conference: What I Got Out of the Mathematical Conference,
   Mr. W. F. Head, Ann Arbor.
7. Biological Conference: Miss Lenore Conover, Detroit.
8. Commercial Conference: Miss Anna M. Yorks, Highland Park.
9. Physiography and Geography Conference: Professor Mark Jefferson, Normal College.
10. Art Conference: Mrs. Katherine Margah, Highland Park.
11. Manual Training Conference: Mr. J. H. Trybon, Detroit.
12. Educational Psychology Conference: Points from the Psychology Conference,
    Mr. J. F. Thomas, Detroit.
13. Home Economics Conference: The Gist of the Home Economics Conference,
    Dean White, M. A. C.

Friday Evening, March 30

8:00 o'clock

New Science Building Auditorium
Geographical Knowledge in the Time of Leonardo da Vinci,
Professor George Sarton, Wondelgem, Belgium.

Saturday Afternoon, March 31

12:00 o'clock

Barbour Gymnasium

1. Alumnae Luncheon.
   (Tickets at 75c should be secured by March 29.
   Apply to Dean Jordan)
2. Junior Girls' Play.
   (Tickets at the door, 35c)

PROGRAM OF CONFERENCES

CLASSICAL INSTITUTE-CONFERENCE

Tuesday Forenoon, March 27

8:00 o'clock
Small Lecture Room, Alumni Memorial Hall

1. Sidelights on the Study of Virgil: I. The Tomb of Virgil; II Ancient Portraits of Virgil,*
Francis W. Kelsey, University of Michigan.

11:00 o'clock
UNIVERSITY LECTURE

2. Aspects of Roman Life: I. Rome as Mistress of the World,*
Professor Ralph V. D. Magoffin, Johns Hopkins University.

Tuesday Afternoon, March 27

2:00 o'clock
Upper Lecture Room, Alumni Memorial Hall

3. Round Table: Present Problems of the Latin Teachers in Michigan High Schools,
Discussion led by Professor B. L. D'Ooge, State Normal College, Miss Maude A. Isherwood, Grand Haven High School, and Superintendent R. Hazelton, Marine City.
General Discussion.

4:15 o'clock
UNIVERSITY LECTURE
Upper Lecture Room, Alumni Memorial Hall

4. Aspects of Roman Life: II. Contemporary Pictures of Roman Life and Death,
Professor Ralph V. D. Magoffin, Johns Hopkins University.

Wednesday Forenoon, March 28

9:00 o'clock
Small Lecture Room, Alumni Memorial Hall

5. Sidelights on the Study of Virgil: III. The Constellations as seen by Virgil,*
Francis W. Kelsey, University of Michigan.

11:00 o'clock
UNIVERSITY LECTURE

6. Aspects of Roman Life: III. The Roman in his Hours of Ease,*
Professor Ralph V. D. Magoffin, Johns Hopkins University.

Wednesday Afternoon, March 28

4:15 o'clock
Upper Lecture Room, Alumni Memorial Hall

7. Public Address: Costumes of the Greek Play,*
Dr. F. E. Robbins, University of Michigan.
8. Public Address: The Greek Play, ("Iphigenia among the Taurians"),
Professor Campbell Bonner, University of Michigan.

Wednesday Evening, March 28

8:15 o'clock
Upper Lecture Room, Alumni Memorial Hall

9. An Illustrated Mediaeval Commentary on the Book of Revelation,*
Professor Henry A. Sanders, University of Michigan.

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* Illustrated with the Stereopticon.

Thursday Forenoon, March 29

8:00 o'clock
Small Lecture Room, Alumni Memorial Hall

10. Sidelights on the Study of Virgil: IV. Color as Decorative Element in the Surroundings of Virgil; V. Virgil's Local Associations, Particularly in Relation to the Young Marcellus,*
Francis W. Kelsey, University of Michigan.

TWENTY-THIRD CLASSICAL CONFERENCE

(Admission by badge)

Chairman—Francis W. Kelsey, University of Michigan.
Vice-President—Miss Marion L. Jennings, Union High School, Grand Rapids.
Secretary—Miss Clara J. Allison, High School, Owosso.
Extension Committee—
Miss Clara J. Allison, Owosso.
Dr. F. O. Bates, Central High School, Detroit.
Professor A. R. Crittenden, University of Michigan.

All Papers limited in length to 20 minutes

Thursday Noon, March 29

11. Classical luncheon at 12:30, parlors of the Congregational Church. Brief addresses by President H. B. Hutchins, University of Michigan, and Professor Louis E. Lord, of Oberlin College, representing the Classical Association of the Middle West and South. Tickets, fifty cents; places reserved for those who notify Professor A. R. Crittenden.

Thursday Afternoon, March 29

2:00 o'clock
Upper Lecture Room, Alumni Memorial Hall

12. Cromlechs and the Grave-Circle at Mycenae,*
Professor John G. Winter, University of Michigan.
13. Explanation of charts illustrative of Caesar's Battlefields in Gaul, (Exhibit shown in Memorial Building, basement).
Miss Dorothy Roehm, Detroit.
14. Latin from the Superintendent's Viewpoint,
Superintendent M. W. Longman, Owosso.
15. High School Latin from a Practical Viewpoint,
Miss Nellie G. Congdon, Hillsdale High School.
16. Latin Exhibit made under the direction of Mr. John C. Dana, Librarian of the Free Public Library, Newark, N. J. (Exhibit shown in Memorial Bldg., basement.)
Professor W. W. Bishop, Librarian of the University of Michigan.

Business Meeting.

4:15 o'clock
Upper Lecture Room, Alumni Memorial Hall

UNIVERSITY LECTURE

17. Aspects of Roman Life: IV. The Serious Walks of Roman Life,*
Professor Ralph V. D. Magoffin.

* Illustrated with the Stereopticon.

Friday Afternoon, March 30

Joint Session of the Classical and Mathematical Conferences

1:30 o'clock

Upper Lecture Room, Alumni Memorial Hall

18. Address: The New Humanism,
    Dr. George Sarton, Wondelgem, Belgium, Editor of Isis.

2:30 o'clock

19. Wilamowitz and Sherlock Holmes,
    Professor Louis E. Lord, Oberlin College.
20. A Fifteenth Century Excursion to the Phlegraean Fields,*
    Dr. Orma F. Butler, University of Michigan.
21. Glimpses of Crete,*
    Dr. Gertrude M. Beggs, University of Michigan.
22. The Speech Ascribed to Critognatus in the Seventh Book of Caesar's Gallic War as a Typical Roman Oration,
    Mr. Rollin C. Hunter.

MODERN LANGUAGE CONFERENCE

(Admission by badge)

Chairman—Dean J. R. Effinger, University of Michigan.
Secretary—Professor A. G. Canfield, University of Michigan.

Thursday Afternoon, March 29

2:30 o'clock
Room 203, University Hall

Presiding Officer—Dean J. R. Effinger.

1. Literature in Spanish America,
   Mr. Julio del Toro, University of Michigan.
2. College Entrance Requirements in Modern Languages:
   (a) From the point of view of the University:
   French, Professor A. G. Canfield, University of Michigan.
   German, Professor Max Winkler, University of Michigan.
   (b) From the point of view of the High School: What the pupil should have learned in two, three, or four years,
   Miss Eva P. Carnes, Kalamazoo High School.
   Miss Grace A. Hill, Detroit Central High School.
   And others.
3. Business Meeting.

Friday Afternoon, March 30

1:30 o'clock
Room 203, University Hall

Presiding Officer—Miss Alice E. Rothman, President of the Michigan Association of Modern Language Teachers.

4. Modern Languages in the Junior High School and grades.
   This main topic will be discussed from various angles, but the names of the speakers can not yet be announced.
5. Round Table: Topic, Shall we have Special Composition Books and Special Composition Lessons?
   Conducted by Mr. Lewis Reichle, Nordstrum High School, Detroit.

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* Illustrated with the Stereopticon.

ENGLISH CONFERENCE

(Admission by badge)

Friday Afternoon, March 30

1:30 o'clock

High School Auditorium

Chairman—Mr. F. G. Thompkins, Central High School, Detroit.
Secretary—Miss Mary N. Eaton, South High School, Grand Rapids.

1. Producing the High School Play,
   Miss Mae Hadley, Central High School, Detroit.
2. Examinations,
   Mr. C. C. Certain, Cass Technical High School, Detroit.
3. Modern Poetry,
   Mr. Lyman L. Bryson, University of Michigan.

HISTORY CONFERENCE

(Admission by badge)

Thursday Afternoon, March 29

2:00 o'clock

Room C-3, High School

Chairman—Professor T. P. Hickey, Western State Normal.
Secretary—Miss Mary Conlon, Grand Rapids.

1. Community Civics,
   Miss Julia Fitzpatrick, Grand Rapids.
2. Address,
   Rt. Rev. Mons. O'Brien, Kalamazoo.
3. The Consular Service,
   Professor R. T. Crane, University of Michigan.
4. General Discussion.

Friday Afternoon, March 30

1:30 o'clock

Room C-3, High School

5. Course in History for Commercial and Industrial Arts Students,
   Principal I. B. Gilbert, Grand Rapids.
6. Discussion,
   Superintendent E. C. Warriner, Saginaw.
7. Latin America and the Far East,
   Professor W. L. Schurz, University of Michigan.

PHYSICS AND CHEMISTRY CONFERENCE

(Admission by badge)

Thursday Afternoon, March 29

1:30 o'clock

Physical Laboratory, West Lecture Room

Chairman—Mr. B. E. Smith, Grand Rapids Central.
Vice-Chairman—Mr. W. H. Clark, Detroit Northern.
Secretary—Principal E. N. Worth, Kalamazoo.

1. Field Day with Physics Classes,
   Mr. Joseph G. Wolber, Detroit Cass Technical.

2. An Experiment to Illustrate the Fixation of Atmospheric Nitrogen,
   Mr. Harry C. Doane, Grand Rapids Central.

3. What Constitutes a Good Course in Physics?
   Dr. F. R. Gorton, State Normal College, Ypsilanti.

4. The Manufacture, Properties and Special Uses of Glass, including a discussion of what is being done in America to supply glass originally imported,
   Mr. Henry W. Hess, Chief Chemist, Libbey Glass Co., Toledo.

5. Experimental Use of the Alternating Current in High School Physics,
   Dr. D. L. Rich, University of Michigan.

6. Some of the Great Chemists (Illustrated),
   Dr. William McPherson, University of Ohio.

7. Waves Versus Rays,
   Mr. Henry R. Vaughan, Detroit Central.

8. Business Meeting.

Friday Afternoon, March 30

1:30 o'clock

Physical Laboratory, West Lecture Room

9. Applied Chemistry for Mixed Classes,
   Mr. C. D. Basler, Bay City.

10. Electrical Measurements for Secondary Schools,
    Mr. G. I. Altenberg, Highland Park.

11. Some Things that a Student should get out of a Course in Chemistry,
    Dr. William McCracken, Western State Normal, Kalamazoo.

12. Recent Theories of Atomic Structure,
    Dr. H. M. Randall, University of Michigan.

13. Chemistry in the High School as Preparation for Chemistry in the University,
    Dr. Alfred L. Ferguson, University of Michigan.

14. The Physics Teacher and His Preparation,
    Mr. H. N. Chute, Ann Arbor High School.

15. A One Year Course in Household Chemistry,
    Mr. H. S. Doolittle, Ann Arbor High School.

MATHEMATICAL CONFERENCE

(Admission by badge)

Thursday Afternoon, March 29

12:30 o'clock

Luncheon at Lane Hall.

Advance registration for the luncheon (60c) is urgently requested; notify Professor L. C. Karpinski, Ann Arbor.

2:00 o'clock

Lecture Room, Tappan Hall

Chairman—Principal John A. Craig, Muskegon.
Secretary—Dr. W. V. Garretson, University of Michigan.

1. The Minimum Requirement in Secondary Mathematics for Graduation,
   Principal William Prakken, Highland Park.
2. My Experience in Teaching Algebra,
   Mr. John E. Porter, Northwestern High School, Detroit.
3. Should Mathematics Courses in High School be Differentiated for Cultural and Practical Purposes?
   Miss Estelle Nash, Arthur Hill High School, Saginaw.
4. Subjects that Vocational Mathematics Should Include,
   Mr. F. E. Wilcox, Central High School, Grand Rapids.
5. Is it Possible for High School Mathematics to Function during the Process of Learning,
   Principal N. C. Nielson, Charlotte.
6. Loss of Efficiency in the Recitation,
   Superintendent L. L. Forsythe, Ionia.
7. Is One Year of Algebra in the High School Enough for the Average Pupil?
   Superintendent W. E. Olds, Marshall.

Friday Afternoon, March 30

1:30 o'clock

Alumni Building, Upper Hall

1. Joint Meeting with the Classical Conference.
   Lecture: The New Humanism,
   Professor George Sarton, Wondelgem, Belgium.

2:30 o'clock

Tappan Hall, Lecture Room

2. The Presentation of Variables and Limits to High School Pupils,
   Professor C. B. Williams, Kalamazoo College.
3. What the University Examiner Expects of the Teachers of Secondary Mathematics,
   Professor A. G. Hall, University of Michigan.

BIOLOGICAL CONFERENCE

(Admission by badge)

Thursday Afternoon, March 29

2:00 o'clock

New Science Building, Room F-24

Chairman—Mr. J. R. Locke, Highland Park.
Secretary—Miss Helen B. King, Saginaw.

1. General Science in Michigan Schools,
   Mr. Adrian A. Worun, Sault Ste. Marie.
2. General Science in the Junior High School,
   Miss Mabel Hardy, Highland Park,
3. Discussion of Mr. Worun's Paper,
   Miss Helen B. King, Saginaw.
4. Discussion of Miss Harding's Paper,
   Mr. H. D. Davis, Central High School, Detroit.
5. Open Forum.

Friday Afternoon, March 30

12:00 o'clock

Luncheon for Biologists, Room B-100, Natural Science Building, 40c

1:30 o'clock

6. The Vitalistic Versus the Mechanistic Conception of Life,
   Professor O. C. Glaser, University of Michigan.
7. Discussion,
   Professor Charles E. Barr, Albion College.
8. Senility and its Causes.
   Professor F. C. Newcombe, University of Michigan.
9. The Michigan Biological Survey,
   Professor A. G. Ruthven, University of Michigan.

COMMERCIAL CONFERENCE

(Admission by badge)

Thursday Afternoon, March 29

2:00 o'clock

Room B-8, High School

Chairman—Mr. E. G. Potter, Highland Park.
Vice-Chairman—Miss Dora Pitts, Western High School, Detroit.
Secretary—Miss Anna Johnston, Eastern High School, Detroit.

1. What Business Expects of the High School,
   Mr. Thomas S. Rockwell, Chicago, Ill.
2. The Relation of the University Course in Commerce to the High School Commercial Course, with a Discussion of Entrance Credits,
   Professor Arthur L. Loring, Western State Normal.
3. Discussion.
4. Business Meeting.

PHYSIOGRAPHY AND GEOGRAPHY CONFERENCE

(Admission by badge)

Friday Afternoon, March 30

1:30 o'clock
Room 217-G, New Science Building

Chairman—Professor Mark Jefferson, State Normal College.
Secretary—Mr. Charles Wilcox, Kalamazoo.

1. Preliminary Report of the Committee appointed to investigate the Teaching of Geography and Earth Science in the Approved High Schools of Michigan,
   Superintendent F. W. Frostic, St. Charles, Chairman.
2. Home Geography,
   Professor C. O. Sauer, University of Michigan.
3. Coal Mining in the Saginaw Valley (Illustrated),
   Superintendent F. W. Frostic, St. Charles.
4. Practical Difficulties to be Overcome in Taking Geography Classes out of Doors,
   Professor Mark Jefferson, State Normal College.
5. Business Meeting.

ART CONFERENCE

(Admission by badge)

Thursday Afternoon, March 29

2:00 o'clock
Room A, Alumni Building

Chairman—Mrs. Katherine C. Margah, Highland Park.
Secretary—Miss Beula Wadsworth, Kalamazoo.

1. Where and How to Teach Interior Decorating and Costume Design in Public Schools, Illustrated,
   Miss Agnes Van Buren, Grand Rapids.
2. Discussion.
3. The Little Theatre Movement,*
   Mr. G. P. Tompkins, Central High School, Detroit.
4. Manual Training and Its Relation to Art,
   Miss Alice I. Boardman, State Normal College.
5. Business Meeting.

MANUAL TRAINING CONFERENCE

(Admission by badge)

Friday Afternoon, March 30

1:30 o'clock
Room C-1, High School

Chairman—Mr. E. G. Allen, Cass Technical High School, Detroit.
Secretary—Mr. J. R. Jenson, South High School, Grand Rapids.

1. What the New York Edison Company finds it Necessary to Teach their Employees in their own Corporation School.
   Mr. F. C. Henderschott, New York, Head of the Educational Department of the New York Edison Co., and Secretary of National Association of Corporation Schools.
2. General Round Table Discussion.
3. Business Meeting.

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* Illustrated with the Stereopticon.

EDUCATIONAL PSYCHOLOGY

(Admission by badge)

Thursday Afternoon, March 29

2:00 o'clock
Physics Lecture Room, High School

Chairman, J. F. Thomas, Martindale Normal, Detroit.

1. The Selection of Pupils of Superior Capacity,
   Mr. Leo J. Brueckner, Detroit Normal School.
2. The Marking System of the University of Michigan,
   Dr. F. S. Breed, University of Michigan.
3. Round Table Discussion.
4. Election of Officers.

HOME ECONOMICS CONFERENCE

(Admission by badge)

Thursday Afternoon, March 29

2:00 o'clock
Room B-1, High School

Chairman—Deda L. Emmons, Detroit.
Secretary—

1. Standardizing our Course of Study for the State,
   Dean Georgia L. White, Michigan Agricultural College.
   Miss Blackman, State Normal College.
   Miss Eleanor Temple, Central High School, Grand Rapids.
2. Domestic Science.
   Miss Grace P. McAdam, Eastern High School, Detroit.
3. Domestic Art.
   Miss Lulu G. Becker, Nordstrum Junior High School, Detroit.

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Kimball, Edith M.
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Miner, Mary L.
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Wagner, T. E.
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Corns, J. H.
Phelps, Nancy S.
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IONIA
Forsythe, L. L.
JACKSON
Marsh, E. O.
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Williams, Geo. A.
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Gallup, E. E.
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MUSKEGON
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Running, T. R.
Swain, G. R.
Tilley, M. P.
Winkler, Max
Ziwet, Alexander
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Hickey, T. P.
Waldo, D. B.
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Cody, Frank
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Guysi, Alice V.
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Farnsworth, Mary F.
Kepler, F. R.
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Bishop, Mrs. H. A.
Bishop, Helen L.
Chase, Ethel W. B.
Copeland, Cornelia A.
Darnell, Albertus
Gee, E. F.
Hine, Katherine G.
Hull, Isabella H.
Irwin, F. C.
Mackenzie, David
Malcomson, Rachel A.
Mutschel, Matilda
Roby, Anne M.
Stocking, W. R. Jr.
Thompson, E. C.
Thompson, Margaret E.
Watt, Isabella R.
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Harvey, Caroline C.
Linn, Flora R.
Lusby, Lulu V.
Pettee, Edith E.
Strubel, R. H.
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Liggett, Miss J. M.
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Conover, L. Lenore
Fleming, Jennie M.
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Hall, C. F.
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Fyan, Lila E.
Kimball, Edith M.
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Bechtel, G. G.
Flintermann, Emilie A.
Isbell, W. N.
Miner, Mary L.
Walsh, May
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Rivett, B. J.
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Wentworth, Wm. H.
Whitney, Edward
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Corns, J. H.
Phelps, Nancy S.
DETROIT WESTERN
Bancroft, Nellie E.
Fruitig, Marie L.
Hempsted, Johanna K.
Hendershott, E. Pearl
Hickok, D. W.
Holmes, E. L.
Holmes, F. H.
McMillan, D. W.
Matthews, J. W.
Meiser, Augusta B.
Morse, Wm. A.
Pitts, Dora
Roper, Gertrude
Sundstrum, Elizabeth
Towar, Ethel L.
Waples, Marcia
Weir, W. W.
Wilkinson, A. O.
Wiltsie, Katherine D.
FENTON
Lyons, D. F.
FERRIS INSTITUTE
Ferris, W. N.
FLINT
Cody, A. N.
Nutt, H. D.
Parmelee, L. S.
Puffer, W. J.
Wellwood, J. E.
Wright, L. L.
GRAND RAPIDS
Calkins, Charlotte W.

Davis, Jesse B.
Greeson, W. A.
Hulst, Cornelia S.
Jones, Anna S.
HIGHLAND PARK
Knapp, T. J.
Leonard, G. O.
Locke, J. R.
Margah, Mrs. K. C.
Prakken, Wm.
Van Loon, G. E.
HILLSDALE COL.
Mauck, J. W.
IONIA
Forsythe, L. L.
IRON MOUNTAIN
Butler, L. A.
JACKSON
Britten, Caroline E.
Marsh, E. O.
Watkins, E. E.
KALAMAZOO
Worth, E. N.
KALAMAZOO COL.
Praeger, W. E.
Williams, C. B.
Williams, Geo. A.
LUTHER
Gould, Wm. E.
MANCHESTER
Kirchhofer, Marie
MARINE CITY
Hazelton, R.
MONROE
Gallup, E. E.
Gilday, Selma
Highley, A. M.
MUNISING
Abell, E. L.
Smith, R. H.
MUSKEGON
Craig, J. A.
Hartwell, S. O.
NILES
Allen, Hilah L.
NORMAL COLLEGE
D'Ooge, B. L.
Goddard, Mary A.
Gorton, F. R.
Harvey, N. A.
Jones, L. H.
Laird, S. B.
Lott, H. C.
Lyman, E. A.
Maxwell, G. W.
Muir, Helen B.
Norris, O. O.
Pearce, W. H.
Peet, B. W.
Priddy, Bessie L.
Strong, E. A.
Wilber, H. Z.
NORTHERN NORMAL
Spooner, C. C.
OAK PARK, ILL.
Lee, L. B.
OWOSSO
Allison, Clara J.
Longman, M. W.
OXFORD, OHIO
Bishop, Elizabeth L.
PONTIAC
Dudley, S. M.
Jenner, G. L.
McCarroll, Sarah
Travis, Ora
PORT HURON
Crane, Mrs. S. A.
Davis, H. A.
Lewis, W. F.
RIVER ROUGE
McDonald, A.
SAGINAW
King, Helen B.
Tanis, J. E.
Warner, W. W.
Warriner, E. C.
ST. CHARLES
Frostic, F. W.
ST. JOHNS
Buck, F. P.
Daboll, Winifred C.
SUPERIOR, WIS.
Wade, C. G.
TRAVERSE CITY
Tyler, L. L.
UNIVERSITY
Beman, W. W.
Berry, C. S.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Butler, Orma F.
Canfield, A. G.
Crittenden, A. R.
Cross, A. L.
Dow, E. W.
Edmonson, J. B.
Finney, B. A.
Glover, J. W.
Hall, A. G.
Hauhart, W. F.
Hildner, J. A. C.
Hutchins, H. B.
Karpinski, L. C.
Kelsey, F. W.
Kraus, E. H.
Leverett, Frank
Lichty, D. M.
Markley, J. L.
Martin, Helen M.
Meader, C. L.
Nelson, J. R.
Newcombe, F. C.
Pollock, J. B.
Rich, D. L.
Running, T. R.
Scott, F. N.
Scott, I. D.
Swain, Geo. R.
Tilley, M. P.
Trueblood, T. C.
Wenley, R. M.
Williams, N. H.
Winkler, Max
Winter, J. G.
Ziwet, Alexander
WAYNE
Raycraft, R. E.
WESTERN NORMAL
Burnham, Ernest
Everett, J. P.
Harvey, L. H.
Hickey, T. P.
Waldo, D. B.
YPSILANTI
Arbaugh, W. B.
Hardy, Carrie A.
Ross, De Forrest
Steere, Edith A.

List of Members for 1917

ADRIAN
Irish, Ella P.
Marshall, Viola
Mills, M. E.
Reed, E. J.
Van Auken, Blanche
Willsey, Cora M.
ALBION
Cline, Esther
Fast, L. W.
Langworthy, F. M.
ALBION COLLEGE
Barr, C. E.
Beal, Arthur F.
Fall, Delos
Goodrich, F. S.
Greene, C. W.
ALMA
Luchtman, A. C.
ALMA COLLEGE
Crooks, H. M.

ANN ARBOR
Adams, O. V.
Bennett, Ella M.
Breed, Gertrude T.
Brink, L. R.
Brown, Jessie
Brown, Ruth
Chute, H. N.
Cornwell, Matie P.
Dicken, Carrie L.
Downs, Mrs. Lulu
Doolittle, H. S.
Eagleson, Stuart.
Ehle, C. E.
Essery, E. E.
Essery, Florence
Georg, Louise
Glasier, Lucy
Goodell, F. Maude
Granville, Robt.
Groefsema, Mrs. E. H.
Hamilton, F. G.
Head, W. F.
High, J. B.
Hodson, Catherine E.
Jocelyn, L. P.
Magdalene, Sister M.
Martin, E. J.
Nelson, Harriet A.
O'Brien, Sarah
O'Hearn, May
Palm, M. C.
Palmer, Mrs. J. V.
Parry, Edna
Plympton, Mrs. C. G.
Porter, Alice
Purtell, Catherine
Ray, Anna M.
Rennie, Florence M.
Robison, Cora
Robson, Louise
Rolfe, E. C.
Rood, O. A.
Rosenthal, Henrietta
Rothman, Alice
Schaible, Ida M.
Slauson, H. M.
Springer, D. W.
Steele, Anna
Taylor, Alice
Tinkham, Lona C.
Weinmann, Louise
Wines, L. D.
Woessner, Anna L.

BANGOR
Murphy, Dr. N. D.

BENZONIA
Norwalk, O. F.

BATTLE CREEK
Atkinson, H. R.
Cimmer, Alice M.
Coburn, W. G.
Krell, Carrie
MacKenzie, Flora I.
Price, G. G.

BAY CITY
Basler, C. D.
Beese, Julia H.
Bell, Francis
Bishop, Lola L.
Bothe, Eva
Butterfield, G. E.
Caldwell, Adah
Campbell, Florence
Carlton, Ruby
Carter, F. R.
Crawford, G. B.
Day, Agnes A.
Garlock, C. R.
German, W. L.
Hunker, Emma
Liskow, Julia
MacGregor, Helen
McKinney, Mary
McVittie, Alex
Maloney, Chas.
Merrill, Frances H.
Paine, Myra A.
Parker, R. A.
Paxton, R. D.
Peake, Ora B.
Perkins, W. L.
Rogers, F. B.
Skinner, G. H.
Sloan, N. B.
Taylor, Harriet L.
Ten Eyck, H. E.
Wells, Berta A.

BELDING
Langston, J. A.

BENTON HARBOR
Dewey, Alice R.

BIG RAPIDS
Wood, Oscar

BIRMINGHAM
Cobb, O. C.
Spencer, Ruth

BRITTON
Smith, H. L.

BUCHANAN
Updike, Mrs. Audrey

CADILLAC
Barker, John B.
Cockrell, E. T.
McGee, G. A.
Millspaugh, Helen J.
Peet, C. H.
Rosewarne, Ruth
Sawyer, Christabel

CAPAC
Gibb, H. L.

CASS CITY
Sparling, Jewel

CEDAR SPRINGS
Luidens, J. E.

CENTRAL NORMAL
Calkins, R. D.
Grawn, C. T.
Larzelere, C. S.

CHARLOTTE
Gillert, G. W.
Nielsen, N. C.

CHEBOYGAN
Barr, W. L.
Thors, John

CHESANING
Bollinger, C. J.
Eddy, Anne

CHICAGO, ILL.
Denoyer, L. P.
Hagar, H. A.
Johnson, H. M.

CLARE
Hornberger, J. J.

CLEARY'S BUS. COL.
Cleary, P. R.
Wainwright, Mrs. K.

COLOMA
Conrad, W. A.

DETROIT
Andre, Ruba
Arbury, F. W.
Arthur, Norman
Barns, Burton A.
Becker, Lulu M.
Belisle, J. H.
Beverley, Clara
Birkam, Geo.
Boyer, C. J.
Burns, C. G.
Chadsey, C. E.
Cleveland, Elizabeth
Cody, Frank
Cole, Conscello
Conover, Grace
Courtis, S. A.
Covey, Blanche
Evangelista, Sister M.
Grant, Julia
Guysi, Alice V.
Guysi, Jeannette
Hutson, Agnes
Immaculata, Sister M.
Kinny, Christiana
Lake, J. G.
Lannin, Jean
Lightbody, W. M.
McSweeney, Katherine
Mans, Louise
Merrill, John
Miller, Flora M.

Miller, H. W.
Morse, J. A.
Oliver, Loraine
Palmer, Adnee
Peek, Louise B.
Priest, Maude A.
Renshaw, Miss S.
Roehm, Dorothy
Shaw, Miss E. P.
Shaw, E. R.
Simmons, Orville
Spain, C. L.
Stevens, Mrs. F. B.
Theodosia, Sister M.
Trybon, J. H.
Van Adestine, Gertrude
Weideman, Mathilde

DETROIT CASS TEC.

Allen, E. G.
Byrn, M. L.
Certain, C. C.
Comfort, B. F.
Connolly, Helen M.
Cooke, C. S.
Farnsworth, Mary F.
Holmes, D. L.
Holtsclaw, J. L.
Howell, J. C.
Jones, Geo. W.
Keal, H. M.
Kepler, F. R.
Kibby, C. G.
Knights, Ethel L.
Merriman, Vivien
Phillips, Nellie G.
Stowell, B. D.
Wolber, J. G.

DETROIT CENTRAL

Anderson, Flora L.
Andre, Elonia
Bates, F. O.
Bishop, Mrs. H. A.
Bishop, Helen L.
Bowerman, C. B.
Brown, H. E.
Brown, J. S.
Camp, Mary F.
Campbell, Caroline E.
Carter, G. W.
Chapman, H. H.
Chase, Ethel W. B.
Collins, John A.
Conover, Kate B.
Copeland, Cornelia A.
Darnell, Albertus
de Gomar, Juan A.
Fell, D. J.
Fishbaine, S. S.
Gee, E. F.
Hadley, May
Hardy, J. R.
Harrah, Grace E.
Hawley, Elizabeth W.
Hine, Katharine G.
Hoffman, R. O.
Hull, Isabella H.
Irland, Helen
Irwin, F. C.
Jones, Mrs. Grace C.
Lang, Henrietta D.
Mackenzie, David
Malcomson, Rachel A.
Mann, L. B.
Millard, Grace G.
Mutschel, Matilda
Parker, Caroline
Purdie, Edith B.
Rhines, Minerva B.
Richardson, Ruby E.
Roby, Anne M.
Sargeant, Charlotte H.
Schwartz, Elise M.
Stocking, W. R. Jr.
Thompson, E. C.
Tompkins, F. G.
Thompson, Margaret
Torr, Mary D.
Vaughan, H. R.
Watt, Isabella R.
Whitham, Jessie I.
Wicks, Louise

DETROIT EASTERN

Bishop, J. R.
Currie, Alice L.
Dietz, Ada K.
Fuhry, E. G.
Harper, Anna
Harvey, Caroline C.
Hauser, Alice J.
Hazelton, Mrs. Julia J.
Henze, Paula
Linn, Flora R.
Lusby, Lulu V.
McAdam, Grace P.
Mahoney, Anna G.
Marsh, Alice Louise
Merriam, A. R.
Pettee, Edith E.
Putnam, R. R.
Schmidt, E. H.
Sewell, Grace
Struble, R. H.
Tennant, Nettie J.
Vernor, Edna L.

DETROIT JOYCE JUNIOR

Crittenden, Janet
Dohany, E. E.
Foster, Christine
Mead, Madge
Newkirk, Mary L.
Thornton, Myrtle
Townley, Margaret G.
Whiteside, Adrienne

DETROIT LIGGETT SCHOOL

Liggett, Miss J. M.

DETROIT MARTINDALE NORMAL

Brueckner, Leo
Conover, L. Lenore
Fleming, Jennie M.
Gillmore, Gertrude A.
Hard, Helen L.
Hopper, Katie A.
Smith, Winifred L.
Thomas, J. F.

DETROIT NORDSTRUM

Abair, Effa M.
Abbott, Emily M.
Amberson, Matilda
Bailey, Carroll
Benson, Earl F.
Bow, W. E.
Buck, Mabel E.
Cox, Chas. C.
Ettinger, L. P.
Fricke, Fred F.
Hall, C. F.
Hamilton, Amanda J.
Hamilton, Laura
Hendricks, Loretta
Hitchings, Bessie M.
Huber, Gertrude
Jones, Winnie M.
Kearney, Frances
Lyons, Ward.
Miller, L. W.
Mote, E. L.
Muffitt, T. S.
Murdock, G. W.
Palmer, Cora E.
Parke, Cleantha
Reichle, Lewis
Reichle, Mrs. Lewis
Slick, R. A.
Spicer, C. E.
Strohmer, R. H.
Wheeler, Lulu
Whiteside, Marrietta
Wiard, Alice
Wixson, W. W.
Woodard, W. H.

DETROIT NORTHEASTERN

Bright, Alma A.
Cooper, L. G.
Fyan, Lila
Hall, Florence B.
Hickie, Beatrice
Hutchins, Kate M.
Jackson, Virginia M.

Kimball, Edith M.
Ladd, Bessie F.
Mullen, Mrs. Selah W.
Novak, Chas. M.
Plee, N. Octavia
Ripley, Alice
Ruhlman, Marie

DETROIT NORTHERN
Allman, Russell V.
Bach, Ellen
Bartlett, A. E.
Beard, Harriett
Bechtel, G. G.
Bishop, Newbold
Chaney, Marjorie
Clarke, W. H.
De Greene, A. L.
Elliott, Ruth
Fave, E. H.
Flintermann, Emilie A.
Haberstiche, Felecie L.
Hall, H. P.
Hayes, H. B.
Hayner, Elizabeth
Hill, Olah J.
Isbell, W. N.
Jillson, G. F.
King, Blanche L.
King, Ruth
Kinney, Eva M.
Knight, Jean B.
Lienau, O. P.
MacDonald, Agnes
McKenzie, Florence
Miner, Mary L.
Sheehan, Geraldine
Sutherland, Olive M.
Truesdale, Ella K.
Walsh, May
Whyte, T. C.
Yocum, Elizabeth

DETROIT NORTHWESTERN
Alley, Sadie M.
Black, Isabelle M.
Bow, L. C.
Burgess, L. G.
Butler, Martha A.
Carey, Eleanor J.
Chapman, Ivan E.
Connely, Mildred M.
Crane, Mary P.
Duffy, Genevieve K.
Elliot, Mary I.
Emmons, Deda L.
Evans, Monica
Fox, Vera E.
Fraser, H. F.
Green, Frances M.
Haigh, Margaret
Hill, Florence J.
Howes, Mary F.
Jackman, W. F.
Jaehnig, May S.
Jones, A. F.
Kelly, P. H.
Larkins, Dorothy
Lindquist, Lily
Long, Mabel
McMillan, Grace
McNally, J. V.
Miller, E. L.
Nicolson, Marjorie
Norris, Nonna
Orth, Louise
Porter, J. E.
Rivett, B. J.
Ryan, Beth
Sabin, Hope
Spence, Chas.
Van Dyke, Karl
Wagner, T. E.
Wentworth, Wm. H.
Whitney, Ada L.
Whitney, Edward
Wilson, Jean W.

DETROIT SOUTHEASTERN
Bogenrieder, Gertrude
Bogenrieder, Margaret
Copeland, Carrie
Corns, J. H.
Cortright, Floy
Currey, Meroe
Curtis, Erta
Dow, Caroline
Ensor, Eunice
Fitzgerald, Alice
Froehlich, A. H.
Gardner, Lucy M.
Hazen, L. M.
Kehoe, Roberta
Mac Farlane, Florence
Martin, Rose F.
Palmerlee, E. Grace
Phelps, Nancy S.
Quirin, Irene
Seath, Margaret
Smith, O. S.
Spafard, Myra B.
Stroh, Eva R.
Sullivan, Margaret C.
Sullivan, Mary G.
Tatlock, Orrett
Walsh, Mary E.

DETROIT UNIVERSITY SCHOOL
Fletcher, D. H.

DETROIT WESTERN
Arms, Nellie A.
Bancroft, Nellie E.
Barney, Bertha C.
Barney, Blanche K.
Brown, Loretta
Brown, Margaret C.
Cameron, H. A.
Coughlan, Nina
Drake, Lucy
Edmonds, Geo. P.
Frutig, Marie L.
Hawn, Effie
Hempsted, Johanna K.
Hendershott, Pearl
Hickok, D. W.
Holmes, E. L.
Holmes, F. H.
Hulbert, W. O.
Kerns, Martha
McMillan, D. W.
Matthews, J. W.
Meiser, Augusta B.
Morse, W. A.
Nelson, Leila S.
Parker, Flora E.
Pitts, Dora
Porter, E. H.
Roper, Gertrude
Seiffert, Berthold
Smith, Grace
Sturm, Alcie K.
Sundstrum, Elizabeth
Thomas, G. C.
Towar, Ethel L.
Waples, Marcia
Warner, W. E.
Weir, W. W.
Wilkinson, A. O.
Willoughby, Ruth A.
Wiltsie, Katherine D.
Woodward, Mabel C.
Wuesthoff, Erna

DOWAGIAC
Berkley, Ruth O.
Frazee, A. F.
Gordon, E. G.
McIntosh, Minnie
Mead, A. R.
Valentine, C. F.

DURAND
Godfrey, A. J.
Joslyn, Anna L.
Mellencamp, Esther

EVART
Cotrell, W. H.
Hosmer, Emma

FENTON
Brown, Opal
Bryce, Isabelle
Killian, E. B.
Lyons, D. F.
Wood, Helen L.

FERRIS INSTITUTE
Ferris, W. N.
FLINT
Armstrong, Louise
Ballard, Edna
Becker, Viola M.
Burns, J. W.
Cody, A. N.
Correll, G. R.
Des Jardins, Helen
Gold, Lillian
Halsted, Bessie
Lee, Ada M.
Lewis, Henrietta
Martin, Eathel
Mudge, Harriet
Nutt, H. D.
Owen, Edith
Parmelee, L. S.
Pratt, L. A.
Puffer, W. J.
Riegle, J. L.
Russell, W. J.
Sdunek, Ottelia
Seymour, Mary S.
Shelly, Florence
Tiemann, H. A.
Wellwood, J. E.
Wheeler, Ruth
Williams, Bertha A.
Wright, L. L.
FOWLER
Gillette, O. H.
Gillette, Mrs. O. H.
GAYLORD
Keyworth, M. R.
Kopka, M. A.
GLADWIN
Allen, Albert
GRAND HAVEN
Clough, Susanna
Hoyt, H. P.
Isherwood, Maude A.
Mann, C. H.
Lewis, Margaret A.
GRAND RAPIDS
Allen, Mabel E.
Baldwin, Mary F.
Bennett, J. G.
Calkins, Charlotte W.
Christ, Helen C.
Church, Blanche A.
Conlon, May F.
Davis, Jesse B.
Doane, H. C.
Fitzpatrick, Julia
Gilbert, I. B.
Greeson, W. A.
Hardon, Mary
Hulst, Cornelia S.
Jones, Anna S.
Kennedy, Keith
Krause, A. W.
Lindberg, Anna E.
O'Callaghan, Beatrice
Pabst, H. W.
Perrin, Elizabeth I.
Schweitzer, Louise
Smith, B. E.
Temple, Eleanor
Van Buren, Agnes
Waring, Eloise E.
Welton, Mary
Wilcox, F. E.
GRANDVILLE
Piper, E. E.
GRASS LAKE
Dorr, A. W.
GREENVILLE
Straight, Chester
HARBOR BEACH
Engle, E. J.
HASTINGS
Miller, Gertrude L.
Wallace, W. T.
HIGHLAND PARK
Altenburg, G. I.
Astleford, Mrs. Josephine
Atkinson, F. H.
Bacon, Grace
Bacon, Josephine
Barr, Beatrice
Barton, Miriam
Beebe, A. H.
Belser, Leona M.
Benjamin, Anna
Card, Marjory
Carpenter, Agnes
Cline, Esther
Cole, Adelaide
Cooper, Jeanette
Deal, Anna
De Voe, I. M.
Dorsey, C. L.
Galatin, Jane
Glassford, A. A.
Gokay, Dora
Graves, Marie
Hall, Mrs. A. J.
Hall, W. C.
Hardy, Mabel
Jackson, Emma
Karshner, Lucile
Kent, Maxine
Kirkendall, Geo.
Knapp, T. J.
Kneip, Therese A.
Koch, Sophie
Leonard, G. O.
Locke, Frances
Locke, J. R.
MacDonald, Isabel
McLeod, Agnes A.
Margah, Mrs. Katherine C.
Mickens, C. W.
Morse, Junia L.
Mulvany, Minnie
Palmer, Sadie
Parsons, R. M.
Phillips, E. Ethel
Potter, E. G.
Potter, Mrs. E. G.
Prakken, Wm.
Quackenbush, E. J.
Rosenthal, Rhoda
Ross, Jean J.
Russell, H. R.
Schilling, Edna
Sherrod, Lowella R.
Smith, P. H.
Streator, Emma
Stubbs, Frances M.
Taylor, Mildren C.
Thomson, Evelyn E.
Van Loon, G. E.
Wallin, Alice
Wannamaker, Phyllis
Ward, Lina J.
White, Lucile
Whitney, Beulah G.
Wilson, Jane
Yorks, Anna M.
HILLSDALE
Congdon, Nellie
Hughes, Clara L.
HILLSDALE COL.
Fess, Gilbert M.
Mauck, J. W.
HOLLAND
Drew, C. E.
HOLLY
Hornberger, D. J.
HOMER
House, Mabel
HOUGHTON
Grant, E. D.
HOWELL
Field, Florence
Rawson, W. J.
Sharpe, E. Alma
Wells, Eunice
Yeakey, L. L.
IMLAY CITY
Rankin, P. T.
IONIA
Curtiss, Mary H.
Forsythe, L. L.
IRON MOUNTAIN
Butler, L. A.

JACKSON
Bliss, F. L.
Britten, Caroline
Coy, Jennie M.
Culver, Ida
Dwyer, Elizabeth O.
Howe, Percy
Josenhaus, R. J.
Kempf, Flora
McCulloch, G. L.
Marsh, E. O.
Messenger, Fern
Paschke, L. A.
Pearce, F. W.
Schiller, G. B.
Smith, Syra
Trumble, O. S.
Watkins, E. E.
Wilcox, Elizabeth L.

KALAMAZOO
Carnes, Eva P.
Drake, E. H.
Howick, Harry
Hyames, A. L.
Moore, Mary
Olney, Daisy C.
Powell, Agnes B.
Richardson, H. A.
Rood, Paul
Russell, Marion F.
Worth, E. N.

KALAMAZOO COL.
Praeger, W. E.
Williams, C. B.
Williams, G. A.

LANSING
Bostedor, Edna
Bristol, Nina
Brown, B. F.
Heath, Marcia
Jensen, J. H.
Keeler, F. L.
Morrison, Belle
Munson, J. M.
Pattengill, H. R.
Sexton, J. W.

LAPEER
Campbell, Mary E.

LESLIE
Ingersoll, Geo.

LITCHFIELD
Eddy, Theo. V.

LUTHER
Gould, W. E.

MANCHESTER
Jacob, G.
Kirchhofer, Marie

MARINE CITY
Hazelton, R.

MARLETTE
Schafer, J. J.

MARSHALL
Simmons, Grace

MASON
Kennedy, J. E.

MICH. AGRI. COL.
Bessey, Ernst A.
Peppard, Mrs. L. L.
White, Georgia L.

MIDLAND
Mott, J. B.

MONMOUTH COLLEGE, ILL.
Wisdom, Mark

MONROE
Cantrick, G. T.
De Pue, A. R.
Domitella, Sister M.
Gallup, E. E.
Gilday, Selma
Highley, A. M.
Van Camp, R. L.
Wagner, Martha

MT. CLEMENS
Camburn, Bessie
De Land, Mary L.
Green, Loa

MT. PLEASANT
De Long, Florence M.

MUNISING
Abell, E. L.
Smith, R. H.

MUSKEGON
Craig, J. A.
Deubel, Ethel
Fuller, E. G.
Hartwell, S. O.
Hubbell, Winifred
Reynolds, Jessie M.
Wines, Emma

NASHVILLE
Rockwood, H. L.

NEWARK, N. J.
Western Electrical Instrument Co.

NEWBERRY
Koepfgen, L. P.

NILES
Allen, Hilah L.
Jelsch, John

NORMAL COLLEGE
Alpermann, ohanna
Beal, Vinora
Blackman, Edith
Blount, Alma
Clark, Genevieve
D'Ooge, B. L.
Elliott, C. M.
Erickson, A. G.
Ford, R. C.
French, Martha H.
Gardner, Emelyn E.
Goddard, Mary A.
Gorton, F. R.
Harvey, N. A.
Hoyt, C. O.
Jones, L. H.
Laird, S. B.
Lott, H. C.
Lyman, E. A.
McKay, F. B.
Manning, G. A.
Maxwell, G. W.
Muir, Helen B.
Norris, O. O.
Norton, Ada A.
Pearce, W. H.
Peet, B. W.
Pray, Carl E.
Priddy, Bessie L.
Smith, Bertram G.
Steimle, C. P.
Strong, E. A.
Walker, Lloyd
Wilber, H. Z.

NORTHERN NORMAL
Spooner, C. C.

NORTHVILLE
Misenar, O. M.

OAK PARK
Lee, L. B.

OLIVET
Aldrich, John A.
Leathers, A. L.
Nadal, T. W.

OWOSSO
Allison, Clara J.
Cleary, Ruth M.
Longman, M. W.
McFarlane, Montie
Meier, Alexina

OXFORD, OHIO
Bishop, Elizabeth L.

PAINESDALE
Jeffers, F. A.

PERRY
Shoemaker, P. H.

PETOSKEY
Lantz, P. G.
Wilbur, R. G.

PLYMOUTH
Hanford, Isabelle

PONTIAC
Allen, D. C.
Dudley, S. M.

Jenner, G. L.
McCarroll, Sarah
Travis, O.

PORT HURON
Anderson, Theo.
Chamberlain, Katherine
Corbin, Byron
Crane, Mrs. S. A.
Davis, H. A.
Hogan, Lillian L.
Lewis, W. F.
Miller, H. L.
Trathen, Rella

PORTLAND
Brown, Mary M.
Kantner, J. N.
Stitt, A. C.

READING
Dalrymple, J. A.

REDFORD
Laing, E. R.

RIVER ROUGE
Freeland, Elma
Frost, Frances
Hoffman, Harriet
Kerns, Marguerita
McDonald, A.
Pobanz, J. F.
Tedrow, W. H.

ROMEO
Brewer, Mary

SAGINAW
Ascher, Margaret M.
Herman, Jessie R.
Kennedy, J. S.
King, Helen B.
Lange, H. C.
Langdon, J. W.
Maegle, Minnie
Nash, M. Estelle
O'Leary, Helen
Tanis, J. E.
Vaughan, F. S.
Warner, W. W.
Warriner, E. C.
Wheelock, Ruth

ST. CHARLES
Frostic, F. W.

ST. CLAIR
Moiles, Sophie
Müller, Frances

ST. JOHNS
Bird, E. J.
Bird, Mrs. E. J.
Buck, F. P.
Daboll, Winifred C.
Wulff, A. J.

ST. JOSEPH
Cole, Mrs. Emma H.

SALINE
Metcalf, A. A.

SARANAC
Wood, F. A.

SAULT STE. MARIE
Bemer, C. W.
Bryan, C. H.
Knapp, Isabel
Worun, A. A.

SCOTTVILLE
Kiebler, E. W.

SHEPARD
Teague, C. H.

STURGIS
Stevenson, Lila

SUPERIOR, WIS.
Wade, C. G.

TAWAS CITY
Swem, Eugene

TEKONSHA
Potter, O. G.

THREE RIVERS
Crawford, F. W.
McCain, Pearl

TOLEDO, OHIO
Curtis, J. W.
Refior, Sophie

TRAVERSE CITY
Tyler, L. L.
Worth, M. L.

UNION CITY
Bassett, Georgiana
Cripps, J. L.
De Barr, Metta
Weltmann, Ruth J.

UNIVERSITY
Bartlett, H. H.
Beman, W. W.
Berry, C. S.
Bishop, Mrs. W. W.
Bonner, Campbell
Bradshaw, J. W.
Breed, F. S.
Butler, Miss O. F.
Butts, W. H.
Canfield, A. G.
Cooley, M. E.
Crittenden, A. R.
Cross, A. L.
Davis, C. O.
Dow, E. W.
Edmonson, J. B.
Effinger, J. R.
Ferguson, A. L.
Finney, B. A.
Florer, W. W.
Ford, W. B.
Glover, J. W.
Hall, A. G.
Hauhart, W. F.
Higbie, H. H.
Hildner, J. A. C.
Hobbs, W. H.
Hollister, R. D. T.
Hutchins, H. B.
Jackson, G. L.
Karpinski, L. C.
Kelsey, F. W.
Kraus, E. H.
La Rue, G. R.
Lasher, G. S.
Leverett, Frank
Levi, M.
Lichty, D. M.
Lindsay, Geo. A.
Lorch, Emil
McLaughlin, Wm. A.
Markley, J. L.
Martin, Helen M.
Meader, C. L.
Moore, Samuel
Moriarty, W. D.
Nelson, J. R.
Newcombe, F. C.
Pollock, J. B.
Randall, H. M.
Rich, D. L.
Robbins, F. E.
Running, T. R.
Sanders, H. A.
Sauer, C. O.
Scott, F. N.
Scott, I. D.
Shull, A. F.
Swain, Geo. R.
Tilley, M. P.
Trueblood, T. C.
Van Tyne, C. H.
Wenley, R. M.
Whitney, A. S.
Williams, N. H.
Winkler, Max
Winter, J. G.
Ziwet, Alexander

VANDERBILT
Jennings, R. F.

WAYNE
Raycraft, R. E.

WESTERN NORMAL
Bowen, A. E.
Burnham, Ernest
Everett, J. P.
Fox, John E.
Harvey, L. H.
Hickey, T. P.

Hockenberry, Mrs. M. Amelia
Hoekje, J. C.
Loring, A. L.
McCracken, Wm.
Reinhold, R. M.
Ruthrauff, Mary
Waldo, D. B.
Zimmerman, Elisabeth

YALE

Drouyor, N. J.

YPSILANTI

Arbaugh, W. B.
Burkheiser, Anna
Hardy, Carrie A.
Kopka, Eva
Lewis, Caroline
Morris, Stanley
Ross, De Forrest
Sargent, Emilie
Steere, Edith A.